



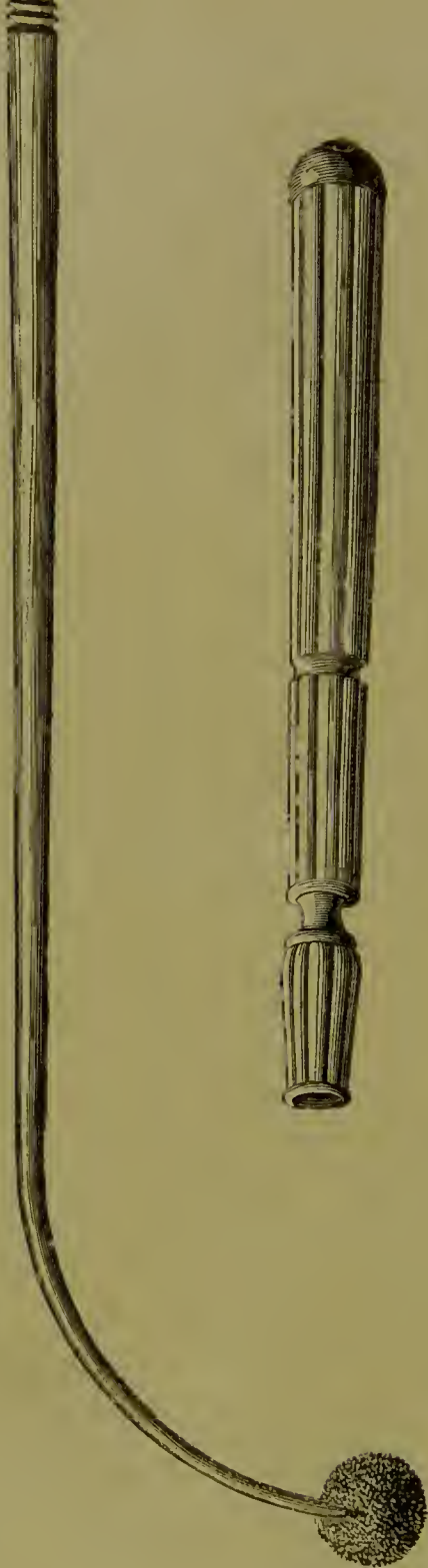
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OBSERVATIONS
ON THE
PATHOLOGY OF CROUP:

WITH
REMARKS ON ITS TREATMENT

BY
TOPICAL MEDICATIONS.

BY
HORACE GREEN, A.M., M.D.,
ETC., ETC.



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## P R E F A C E.

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WHEN, about eighteen months ago, the author brought before the medical public, in a work on Diseases of the Air-Passages, the subject of the treatment of disease of the larynx and trachea, in the adult, by means of the direct application of therapeutical agents to the lining membrane of these cavities, the proposition was received with distrust by a large proportion of the profession; whilst another part publicly and peremptorily declared that it is practically impossible to convey medicinal agents, in the manner proposed, below the epiglottis.

Less than two years have passed, and that practice which, as the British and Foreign Medical Review has remarked, was received by "some of the author's countrymen with a sneering incredulity," and was by them declared to be an "unwarrantable innovation," an "anatomical impossibility," as well as "physiologically impracticable," has been adopted; not only by distinguished medical men in almost every part of this country, but by the highest medical authority of Europe; and by the latter has been commended as a method of treatment which is not only the most effectual and certain in some forms of pulmonary disease, but as one that "will lead to important changes in the prophylaxis and cure of pulmonary phthisis." Less reluctantly, therefore, does the author now advocate—as he has done in the following pages—the practice of making topical application of medicinal agents

into the larynges of young children, for the treatment of membranous croup. Nor does he hesitate to declare, although the proposition may be received by many with allowance, that it is a plan entirely practicable, safe, and, when judiciously employed, in the highest degree efficacious.

The first successful attempt to introduce a solution of the nitrate of silver into the larynx of a child affected with croup, was made by the author, in November, 1842. During a period of nearly four years, previous to this time, he had been constantly employing this remedy, locally, in chronic laryngeal and bronchial diseases of adults. But, up to the above period, such were the prejudices against its employment, and such the scepticism of a large proportion of the profession on the subject of topical applications to the larynx, in the cases of adults even, that, hitherto, he had not ventured on its use in the treatment of diseases in young children; although the happy effects which in so many instances had followed the application of a strong solution of the nitrate to the diseased pharyngo-tracheal membrane and its follicles, had long before convinced him that the same remedy must prove highly efficacious in a disease so strictly local, and of a nature so peculiar, as is that of Croup.

The history of one of the earliest cases of Croup which came under his observation, and was treated by topical applications to the larynx, was given at a meeting of the New York Medical and Surgical Society, November 1st, 1845, and the members present were desired to make trial of the local remedy, whenever an opportunity for employing it in Croup might occur. Several cases were, subsequently, thus treated, and with success, by other medical men in this city; a notice of some of these will be found in the subsequent pages.

In describing, in this work, the application of the nitrate of silver to the mucous membrane, the term *cauterization* is frequently employed. It is not strictly correct ; for, a solution of the crystals of nitrate of silver, of the strength of from two to four scruples of the salt to an ounce of distilled water, when applied freely to the mucous membrane, does not act, as has been supposed, by burning, or as a cautery; it effects no destruction whatever of the textural matter, but forms, immediately, an union with the albumen, and other secretions of the mucous lining ; whilst it operates at the same time to produce a most favorable change in the vital action of the parts.

In conclusion, this little work, and the practice herein advocated, are commended to the candor of that portion of the profession who have the liberality to admit that improvements in the practice of our art can be made ; and the energy and honesty to test such proposed improvements before condemning them.

12 CLINTON PLACE.

New York, Sept. 1848.



# CONTENTS.



|                    | <i>Page</i> |
|--------------------|-------------|
| PREFACE, . . . . . | ix          |

## CHAPTER I.

|                                                                               |    |
|-------------------------------------------------------------------------------|----|
| NATURE AND PATHOLOGY OF CROUP, . . . . .                                      | 1  |
| Frequent fatality of Croup, . . . . .                                         | 2  |
| Opinions as to the nature of Croup, . . . . .                                 | 3  |
| Essential Characteristic of Croup, . . . . .                                  | 4  |
| Albuminous Exudation of Croup, . . . . .                                      | 5  |
| Spasmodic Croup, . . . . .                                                    | 7  |
| Opinions of Guersent, Williams, and others, . . . . .                         | 9  |
| Varieties of Croup by Dr. Ware, . . . . .                                     | 10 |
| Laryngissimus Stridulus of Dr. Cheyne, . . . . .                              | 11 |
| Division of Croup into Laryngeal, Tracheal, and Bronchial<br>Croup, . . . . . | 12 |
| Source of the Exudation in Croup, . . . . .                                   | 14 |
| Commencement of the Morbid Action, . . . . .                                  | 17 |
| Age at which Children are most liable to Croup, . . . . .                     | 19 |
| Stage of the disease when the Exudation commences . . . . .                   | 21 |
| Repeated formation of the Adventitious Membrane, . . . . .                    | 22 |
| Great extent of the False Membrane, . . . . .                                 | 23 |
| Experiments of Jurine, Schmidt, and others, . . . . .                         | 25 |

## CHAPTER II.

|                                                            |    |
|------------------------------------------------------------|----|
| LARYNGEAL AND TRACHEAL CROUP, . . . . .                    | 27 |
| First employment of the topical remedy in Croup, . . . . . | 29 |
| Case of Membranous Croup, . . . . .                        | 31 |
| Case successfully treated, . . . . .                       | 36 |
| Cases of Membranous Croup treated early, . . . . .         | 41 |

## CHAPTER III.

|                                                                           | <i>Page</i> |
|---------------------------------------------------------------------------|-------------|
| MEMBRANOUS CROUP COMPLICATED WITH BRONCHIAL INFLAMMATION, . . . . .       | 45          |
| Commences with Catarrhal Symptoms, . . . . .                              | 45          |
| Case of Bronchial Croup, . . . . .                                        | 46          |
| Symptoms, and their progress, . . . . .                                   | 47          |
| Application of the nitrate of silver to the bronchial membrane, . . . . . | 49          |
| Affects children less than adults, . . . . .                              | 50          |
| Case of Bronchial Croup successfully treated, . . . . .                   | 51          |

## CHAPTER IV.

|                                                                               |    |
|-------------------------------------------------------------------------------|----|
| MEMBRANOUS CROUP COMPLICATED WITH SPASMODIC AND BRONCHIAL SYMPTOMS, . . . . . | 55 |
| Life destroyed by the spasm of Croup, . . . . .                               | 55 |
| Case of Croup with spasmodic symptoms, . . . . .                              | 56 |
| Severe case of Bronchial Croup, . . . . .                                     | 59 |
| The false membrane removed by the applications, . . . . .                     | 62 |
| Employment of Hydrocyanic Acid, . . . . .                                     | 64 |
| Successive layers of albuminous matter, . . . . .                             | 65 |
| Case of Croup by Dr. Bryan, . . . . .                                         | 66 |
| Cases of " " Dr. Blakeman, . . . . .                                          | 70 |
| Case " " " Dr. Ware, . . . . .                                                | 72 |

## CHAPTER V.

|                                                                  |    |
|------------------------------------------------------------------|----|
| OF THE TREATMENT OF CROUP, . . . . .                             | 76 |
| <i>Topical Medications</i> , . . . . .                           | 76 |
| Its employment by Bretonneau, . . . . .                          | 77 |
| Method as practised by M. Guersent, . . . . .                    | 78 |
| Method as practised by M. Trousseau, . . . . .                   | 79 |
| Danger of the application as considered by M. Bouchut, . . . . . | 80 |
| Strength of the solution as ordinarily employed, . . . . .       | 81 |
| Method of making the application, . . . . .                      | 82 |
| Description of the Instrument employed, . . . . .                | 83 |
| The insidious nature of Croup, . . . . .                         | 86 |
| Importance of detecting first symptoms, . . . . .                | 87 |

## CHAPTER VI.

|                                                     |    |
|-----------------------------------------------------|----|
| DIPHTHÉRITE, OR THE CROUP OF ADULTS, . . . . .      | 91 |
| Not identical with the Croup of children, . . . . . | 91 |

|                                                                                                     |            |
|-----------------------------------------------------------------------------------------------------|------------|
| Diphthérite frequently fatal, . . . . .                                                             | Page<br>91 |
| “ occurs often as an epidemic, . . . . .                                                            | 92         |
| Cases recorded by Ryland, . . . . .                                                                 | 92         |
| Case of Diphthérite following measles, . . . . .                                                    | 95         |
| Applications of a strong solution of the nitrate of silver through<br>the rima glottidis, . . . . . | 100        |
| The removal of the false membrane, not the only indication in<br>the treatment of Croup, . . . . .  | 101        |

## CHAPTER VII.

|                                                     |     |
|-----------------------------------------------------|-----|
| TREATMENT OF CROUP CONTINUED, . . . . .             | 103 |
| <i>General Remedies</i> , . . . . .                 | 103 |
| <i>Emetics</i> , . . . . .                          | 103 |
| Antimonial Preparations, . . . . .                  | 104 |
| Tartar Emetic—its effects upon the pulse, . . . . . | 105 |
| “ “ its effects upon young children, . . . . .      | 106 |
| <i>Blood Letting</i> , . . . . .                    | 108 |
| Opinions of different authors, . . . . .            | 109 |
| <i>Mercury</i> , . . . . .                          | 111 |
| “ First employed in Croup by Dr. Rush, . . . . .    | 111 |
| Calomel the best preparation, . . . . .             | 112 |
| Hydrocyanic Acid, . . . . .                         | 113 |
| First employed by the Italian Physicians, . . . . . | 113 |
| <i>Tracheotomy</i> , . . . . .                      | 114 |
| “ Not ordinarily successful, . . . . .              | 114 |
| Opinions of Drs. Cheyne and Ryland, . . . . .       | 115 |

## ERRATA.

Page 12, Sixth line from the bottom, omit comma after *greatest*.

“ 16, Ninth “ “ “ top, for *municiperous*, read *muciperous*.





OBSERVATIONS  
ON THE  
PATHOLOGY OF CROUP.

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CHAPTER I.

NATURE AND PATHOLOGY OF CROUP.

THE distressing nature of *Croup*—its frequent fatality, and the interesting class of patients who, ordinarily, are the subjects of its attack,—invest with a peculiar interest any plan of treatment which promises to mitigate its horrors, or in any degree to lessen its fatality.

Notwithstanding that the energies of some of the most distinguished medical men of the present century have been given to an investigation of the nature and the treatment of this disease, yet it is admitted at the present day by the best authorities, to be not only progressively on the increase, but so far uncontrolled by the ordinary remedial measures, as to prove fatal in

nearly one half of the whole number of those who are attacked by the disease !<sup>1</sup>

With emphasis, then, may it be said, that no member of our profession has discharged his duty, until he has at least made earnest efforts to add something to our stock of knowledge, respecting the pathology or the treatment of this formidable malady.

Not until after the middle of the last century, was Croup recognised and described as a distinct disease. Until that period it was confounded with catarrh, and other diseases of the respiratory apparatus ; but in 1765, Dr. Home of Edinburgh drew up and published an Inquiry into its nature and treatment, and gave to the disease the name of *Croup* ;—an appellation by which it is universally designated at the present day.

The celebrated general order issued by Napoleon, in 1807, from the head quarters of Finkenstein,—“ d’ouvrir un concours sur la maladie connue sous le nom de croup,” with the offered prize, awoke a new interest on this subject in Europe, and was the means of calling forth, from the savans of the continent, many

<sup>1</sup> Traité du Croup, par M. Double, p. 479.

elaborate and able essays on the disease, in which, says Dr. Cheyne, nothing was omitted in illustration of that disorder which industry could collect, or method arrange. These learned inquiries of the aspirants for the prize at concours, have been followed, during the last forty years, by numerous and valued essays on the pathology and treatment of croup, contributed by some of the most distinguished medical men of both Europe and America: and yet the views respecting its essential nature, and the opinions regarding the most certain and efficacious mode of its treatment, are not uniform, or well settled with the profession.

Diverse, moreover, are the opinions of the different writers on croup, with regard to the unity or the division of the disease into distinct varieties; some, on the one hand, making several species of the affection, according to the views entertained of its nature; others, again, considering the disease to be essentially one and the same in all cases, and as being modified only by external circumstances, or by difference of constitution in the subjects attacked.

These varied opinions of different pathologists on this and other affections, serve to embarrass the inexperienced, and to hinder our progress in the knowledge of disease.

Without attempting to settle any of the questions involved in these different opinions, I shall proceed to state that, after having given much attention to the study and treatment of the disease whilst actually engaged in a general practice through a period of more than twenty years, I have come to the following conclusions:—

1. That true croup, pathologically considered, is a special or single disease; being dependent for its existence, like tubercular phthisis, on a peculiar or specific cause.

2. That its distinctive and essential characteristics consist in an inflammation of the secreting surfaces of the fauces, larynx, and trachea, which is always productive of a membranaceous or an albuminous exudation.

3. That the membranaceous concretion, which is found coating the inflamed mucous surface of the parts in croup, is an exudation,—not from the membrane itself, but is secreted by the muciperous glands, which so abundantly stud the larynx and trachea.

4. That the exudative inflammation commences invariably in the superior portion of the respiratory passages, and extends from above downwards—never in the opposite direction.

1. The opinion that croup, in its access, is

essentially one and the same disease—being only modified by epidemic influences, by difference in constitution, or by other fortuitous circumstances, is founded principally on the pathological fact, that the inflammation peculiar to this disease is always attended with an exudation of plastic lymph.

Not that I would here maintain with MM. Guersent and Bretonneau, that the perfect formation of a *false membrane* is necessary to constitute the distinctive character of croup, and that the cases where this is not formed are, as they declare them to be, instances merely of *false* croup; but this I affirm, that inflammation of the respiratory mucous membrane,—whatever may be its grade,—if unattended with an albuminous exudation—can no more constitute croup, than any of the various diseases of the lungs, or of their tissues, which are unaccompanied with a tuberculous deposition, can constitute true pulmonary phthisis.

I agree fully with Prof. Hasse,<sup>1</sup> that the exudation of croup may present various gradations, or different degrees of density. In some instances it consists of a tenacious mucus, wherein

<sup>1</sup> An Anatomical Description of the Diseases of the Organs of Circulation and Respiration. By Charles Ewald Hasse, M.D., &c. Sydenham Society Edition, p. 273.

are suspended thin, membranaceous flocculi,—or, in other words, the viscid mucus is blended with fibrine in various proportions ; sometimes, again, of a layer, resembling both in color and consistency that which settles upon scalded cream ; and sometimes of a firm and tough false membrane of considerable thickness, and which extends not unfrequently from the fauces, throughout the greater portion of the air-passages. Not that this concrete albuminous membrane will be found to be present in all cases of croup, but it is here maintained, that the effusion of coagulable lymph is the essential pathological character of the disease ; and that the degree of density of the plastic exudation will depend upon the intensity of the inflammation, and the duration of the disease. When a child dies very early in the malady, says Dr. Copland,<sup>1</sup> instead of the formation of a concrete false membrane, the parts will be found coated only with a tenacious mucus, or fibrinous exudation. As the disease advances, this glutinous secretion becomes more condensed, and moulded into a false membrane, or it may be found having assumed a but partially concrete condition. “*La présence de cette fausse membrane est le caractère*

<sup>1</sup> Dictionary of Practical Medicine. Article, Croup.



anatomique fondamental de cette affection. Sans ce produit nouveau, il n'y a pas de croup. \* \* \* \*

“Les fausses membranes sont exclusivement formées de fibrine.”<sup>1</sup>

That form of the affection which has been termed Spasmodic Croup by some writers, is a variety of this malady, and not a distinct disease.

When children of a nervous temperament, or of weak and irritable habits, are exposed to the ordinary exciting causes of croup, and become the subjects of the disease, we then have the spasmodic variety of the affection; or, in other words, the inflammation, under such circumstances, is of a sub-acute character; the albuminous secretion is more tardily effused; but there is present, from the commencement of the disease, a great predominance of spasmodic and nervous symptoms. The stricture of the glottis which attends this form of the malady is spasm caused by inflammation, occurring in weak children of the above nervous temperament.

This inflammation, Dr. Cheyne<sup>2</sup> observes, is often spontaneously resolved, the spasm depend-

<sup>1</sup> Manuel Pratique des Maladies des Nouveaux-Nés, et des Enfants à la mamelle. Par M. Bouchut. Article, Croup.

<sup>2</sup> Cyclopædia of Practical Medicine. Article, Croup.

ing upon it subsiding at the same time ; and this has given rise to the opinion that there is a purely spasmodic species of croup,—an opinion not sustained by the pathology of the disease. “With respect to the inflammatory and the spasmodic varieties of croup,” says Mr. Ryland, “I have before stated that this division can refer only to the predominance of either set of symptoms. The nature of the disease is essentially inflammatory, but in weakly, leucophlegmatic children, who are always more subject to nervous affections than the more active and healthy race, it sometimes assumes a spasmodic form, inasmuch as the vascular excitement is comparatively trifling, whilst spasm of the glottis and general convulsions occur frequently during the disease, and the remissions are singularly long and complete.”<sup>1</sup> The occurrence of short intervals of natural breathing, which take place suddenly, every now and then, in spasmodic croup, has been adduced by some writers as characterizing this form of the disease, and as indicating, they suppose, the non-inflammatory nature of the affection. But these remissions, which take place for the most part in the

<sup>1</sup> A Treatise on the Diseases and Injuries of the Larynx and Trachea. By Frederick Ryland, p. 127.



early stage of the disease, occur, not because there is no degree of inflammation present, and, consequently, no obstructions from albuminous secretions, but for the reason that this last morbid condition is not of sufficient extent, at this period of the malady, to embarrass respiration, whenever perfect relaxation from the spasm takes place. As the disease advances, and the membranaceous exudation increases, and becomes denser, the remissions are less complete, and of shorter duration,—the exacerbations more prolonged, and the cough and difficulty of respiration more severe.

M. Guersent, and other pathologists, have shown from the dissection of cases, where this spasmodic form of croup has terminated fatally, that “albuminous concretions—sometimes extensive, but more frequently consisting of small isolated patches, are found in the larynx;”<sup>1</sup> and Dr. Williams, in a Treatise on Diseases of the Respiratory Organs, also affirms that “although the albuminous effusion is generally thickest and most tough in sthenic cases of croup, yet it is pretty abundant in asthenic cases; so much so, that Andral and Gendrin consider plastic inflammation of the mucous membranes to be

<sup>1</sup> Dictionary of Practical Medicine. Article, Croup.

rather of the sub-acute, than of the most acute kind.”<sup>1</sup>

Dr. John Ware of Boston, who, in his admirable “Contributions to the History and Diagnosis of Croup,” has done more to elucidate the true pathology of membranous croup, than any other writer in this country, makes two distinct varieties of the affection, in the pathology of which he thinks there is an original and essential difference.

These two forms of croup, Dr. Ware has distinguished as membranous and inflammatory croup,—the former being characterized by the presence of a false membrane in the air passages, while the latter differs from the first variety only in the supposed absence of this adventitious membrane.

According to Dr. Ware, the severe form of the disease occurs much less frequently than the milder variety, is but little affected by any form of treatment, and is almost always fatal. Of one hundred and thirty-one cases of croup, observed by Dr. Ware, in the course of twenty-five years, twenty-two only of these were cases of true or membranous croup ; of which number nineteen died.

<sup>1</sup> Ut supra, p. 140.

The principal grounds, with Dr. Ware, for believing that the two forms of croup are pathologically different from each other, are thus stated ;—"The very great preponderance of fatal results, in the membranous croup, and a similar preponderance of recoveries in the inflammatory ; and the evidence which exists that in the few cases of recovery from the former, the membrane has been formed, and in the few cases on record of death from the latter, that a membrane has not been formed—afford strong reason for believing that the diseases are essentially different."<sup>1</sup> And yet Dr. Ware, with much candor, observes on another page, "that with our present amount of knowledge, he would not be understood even to assert positively, that they are not different manifestations of the same disease."<sup>2</sup>

In the above form of the disease—which has been considered as a single affection, it is not intended to include that hysterical affection of adult age, described by Dr. Cheyne, which not unfrequently assumes the character of croup ; nor that disease of infancy, termed *laryngissimus stridulus*, which, the above writer observes,

<sup>1</sup> Contributions to the History and Diagnosis of Croup. By John Ware, M.D., p. 12.

<sup>2</sup> Loco citat. p. 3.

ought never to be called croup, inasmuch as it is not attended with cough, and leaves, on dissection, no trace whatever of inflammation of the larynx.

The membranaceous exudation consequent upon violent inflammation of the air-passages during *measles* and *scarlatina*, and which sometimes appears about the fauces, and in the upper portion of the larynx, differs, according to modern pathology, from that which takes place in croup. The fluids having become vitiated in these diseases, there is secreted a much less amount of fibrine than takes place in primary croup ; hence the false membrane is less consistent,—less uniformly spread over the involved part, is friable, and prone to decomposition.

Although it is maintained that croup is essentially a single disease, being only modified by difference in constitution, epidemic influences, and other circumstances ; yet it may with propriety be divided into *laryngeal*, *tracheal*, and *bronchial* croup, according to the seat of the greatest, intensity of the inflammatory action ; and inasmuch as “ the treatment and the prognosis may be in some measure influenced by the locality of the disease,” croup, moreover, may be complicated with, or be consecutive to, other affections of the air-passages. It

may be associated with chronic bronchitis, and there is then presented that form of the disease which Dr. Rush denominated, *Cynanche Trachealis Humida*. In many cases, symptoms of acute bronchitis are predominant, but ordinarily in this form of the affection, the bronchial disease is consequent upon the exudative inflammation. In a large proportion of the cases of croup which terminate fatally, the inflammation will be found to have extended into the bronchi, filling, indeed, the terminal branches, and even the interstitial cells, with an effusion of serum, and it is this bronchial effusion which in some instances is the final cause of the fatal result.

2. The truth of the second proposition stated ; namely, that the essential pathological character of croup is inflammation of the lining membrane of the larynx and trachea, attended by a concrete albuminous exudation, is unanimously admitted by the best pathologists of the day.

The plastic exudation which is poured out upon the surface of the mucous membrane in croup, forms with great rapidity. It consists mainly of fibrine blended with mucus in various proportions ; and it presents different degrees of density, and varies much in thickness, and extent of surface over which it is spread. In some cases, it consists of a tenacious mucus



blended with a small proportion of fibrine ; sometimes of a dense, albuminous concretion ; and, again, it is found in the form of a thick adventitious membrane, extending from the epiglottis without breach of continuity to the extremities of the bronchial ramifications.<sup>1</sup>

3. With respect to the source of that peculiar exudation which is poured out upon the inflamed mucous surfaces in croup, I have before expressed the opinion that it is an effusion from the diseased follicles of the tonsils, larynx, and trachea.

Anatomy has revealed to us that the tonsillary glands are composed, almost entirely, of an aggregated mass of follicles, enveloped in folds of the mucous membrane ; that the lining membrane of the larynx is studded with mucous follicles, especially that portion of it which occupies the upper part of this organ. These glands, indeed, are very numerous in the thickness of the superior vocal cords, within the ventricles of the larynx, and in the folds of the mucous membrane, in front of the arytenoid cartilages. The lining membrane of the trachea is supplied still more abundantly than that of the larynx with the mucous cryptæ.

<sup>1</sup> A Treatise on the Diseases and Injuries of the Larynx, &c. By F. Ryland, p. 134.

Now, it will be found, that wherever these glands are the most numerous in the air passages, there, *ceteris paribus*, will the albuminous exudation be the most abundantly poured out in the inflammation of croup, and the adventitious membrane will be the densest and the most perfectly formed.

The fluid secreted by the mucous follicles of the air-tubes, being intended to lubricate these passages, is, in the normal condition of the glands, bland and transparent, not abundant in quantity, and possesses no qualities of an acrid or adherent nature.

It consists, according to late microscopic observations, of water combined with a viscid substance, which is termed mucus, and which constitutes about five per cent. of the whole amount.

When the mucous membrane of the larynx and trachea becomes the seat of the exudatory inflammation of croup, the glands which in health lubricate its surface, are now found, from some peculiarity of irritation, to elaborate a vitiated fluid, or a fibrinous exudation, which, sooner or later, if the disease continues, is changed into an adherent false membrane, having generally its greatest degree of thickness in the larynx and trachea, but becoming thinner as it descends towards the bifurcation.

The opinion here adduced, that the plastic exudation in croup is poured out by the mucous glandulæ of the parts where the disease is located, finds confirmation in the interesting fact recorded by Prof. Hasse; namely, that “filamentous bands are sometimes found between the plastic exudation and the mucous membrane, consisting merely of delicate fibrous threads *which dip into the orifices of the muciperous glands.*”<sup>1</sup>

4. I have, on a former occasion,<sup>2</sup> expressed the opinion that the physiological and pathological relations which exist between the throat and the respiratory tubes, are not justly regarded by medical writers, in describing the nature of those diseases which affect these different parts.

Affections of the throat are ordinarily arranged by nosologists in connexion with those of the œsophagus: or are treated independently of those diseases which occur in the larynx, trachea, and bronchi.

Pathologically considered, the relation which exists between the fauces, tonsils, and pharynx, on the one hand, and the respiratory tubes on the other, is much more intimate and important

<sup>1</sup> Op. citat. p. 280.

<sup>2</sup> See, A Treatise on Diseases of the Air Passages, &c. p. 24.



than the connexion which exists between the throat and the œsophagus.

In almost all the inflammatory affections of the air-passages, whether primary or consecutive, the diseased action has its origin in the fauces and pharynx, and extends, by continuity, from thence to the respiratory tubes. This is especially true with regard to the origin and progress of the exudatory inflammation of croup. Here, the morbid action commences primarily about the fauces and the upper portion of the respiratory passage, and extends, universally, from above downwards. Dr. Porter, I am aware, observes in his work on the "Surgical Pathology of the Larynx and Trachea,"<sup>1</sup> the effusion of coagulated lymph is very generally confined to the larynx alone ; but still, in a number of cases, the inflammation commences in the bronchial cells, and proceeds upwards in the windpipe. But this view of the course of exudative inflammation is not sustained by the observations of modern pathologists. Professor Rokitansky, who is undoubtedly one of the first pathologists of the age, says, that the exudative process progresses from the epiglottis downwards, extending in some instances to the very minutest branches

<sup>1</sup> Ut supra, p. 36.

of the bronchi; and that bronchial croup is a disease of youth and early manhood, and when occurring in the terminal branches of the bronchi, is always simultaneous with pneumonia,<sup>1</sup> and consequently in such cases cannot be *true* croup. Prof. Hasse also, whose late work on Pathological Anatomy has been translated and published by the London Sydenham Society, observes with regard to the exudatory inflammation of croup, that its progress is invariably from above downwards, and that it never spreads in the opposite direction. This law is so universal, that where plastic inflammation occurs in the bronchi of the adult, as the concomitant of pneumonia, it can only descend to the pulmonary cells, never mount to the larynx.<sup>2</sup>

Let this important point, advanced in this last proposition, with reference to the pathology of the disease, be fully established, and universally understood by the profession, and it will be at once perceived what important results may follow the topical employment of appropriate remedial agents, in the early treatment of true inflammatory croup.

<sup>1</sup> Treatise on Pathological Anatomy, translated by Dr. J. C. Peters, pp. 22 23.

<sup>2</sup> An Anatomical Description of the Diseases of the Organs of Circulation and Respiration. By Charles Ewald Hasse, M. D. &c., Sydenham Soc. Edition, p. 276.

In the preceding brief observations, on some manifestations in the especial pathology of croup, reference has not been had to other important points in its general pathology, to which it may be well briefly to allude.

From an examination of the tables given by M. Caillon, Ryland, and other foreign authors, it appears that croup is a disease of childhood, and attacks children most frequently between the second and tenth years. In this country, the age at which children are most liable to this disease, is probably from one year to eight years old.

There are few cases on record where it has occurred as early as the sixth month. In the table given by Ryland,<sup>1</sup> embracing the experience of some fourteen authors, it had been observed only once at the age of seven months, and never at an antecedent period.

With the morbid changes which are revealed by an examination of the bodies of children who have died of croup, medical men are now generally familiar. Ordinarily, the lining membrane of the air-passages, particularly that of the larynx and trachea, is found inflamed, its tissues tumid, and the entire surface of these parts is coated, either with an adventitious membrane,

<sup>1</sup> Loc. citat. p. 130.

or a less densely formed albuminous exudation, varying in consistence according to the duration of the disease, and the intensity of inflammation which had been present. This exudation is composed almost entirely of fibrine blended with mucus, in various proportions.

In the first stage of the disease the plastic exudation consists of a tenacious mucus, wherein are suspended shreds of coagulable lymph. In the second stage, the mucous surface of the larynx and trachea becomes partially or wholly coated with a membranaceous exudation of considerable density, and which is finally moulded, in the last stage, into a firm, false membrane,—extending sometimes throughout a greater portion of the air-passages, and pervading even the minute ramifications of the bronchial tubes. This membranaceous product, when first formed, adheres with considerable firmness to the mucous membrane; but after an interval, and as the inflammation abates, a watery mucus, or a muco-purulent excretion, becomes deposited beneath the plastic layer, which serves to loosen and to assist in detaching the adventitious membrane, when it is sometimes expelled by violent coughing, either in fragments or in a cylindrical mass, which represents the parts upon which it had been moulded.

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It is a mistake to suppose, as many do, that the secretion of the characteristic discharge of croup begins in the early stages of those catarrhal symptoms, which precede, frequently, for many hours, the development of true inflammatory croup. In the most violent and acute forms of the disease, the plastic exudation commences nearly simultaneously with the inflammation, to be poured out upon the inflamed mucous surface; but in some instances a pre-existing catarrhal stage, of several days' duration, may be present, before the occurrence of that peculiar inflammation which disposes the vessels of the membrane to exude the albuminous deposit. "No sooner, however," says Prof. Hasse, "does the catarrhal irritation merge into inflammation, than the plastic lymph is thrown out, and the parts immediately suffer that disturbance of nervous energy, which results from all violent inflammations."<sup>1</sup> Instances, too, may arise where the early occurrence of violent spasms shall destroy the patient, while as yet the exudation has assumed no degree of density, and it will then be found in the air-passages, presenting the appearance of a layer of viscid, whitish mucus; or, at most, there may be perceived irregular

<sup>1</sup> Op. citat. p. 277.



fragments of adherent lymph in the glottis and larynx, but more particularly about the tonsils. "This glutinous exudation," Dr. Copland remarks, "becomes more and more condensed and moulded into a false membrane, or partially assumes this state, as the disease advances."<sup>1</sup>

The membranaceous exudation differs much, not only in its density, but in its depth, and the extent of surface over which it is spread. It is commonly thickest in the upper and posterior part of the trachea. Dr. Ryland<sup>2</sup> observes that it ranges from half a line to a line and a half. Dr. Copland<sup>3</sup> considers a line and a half or two lines to be its utmost thickness, and Professor Hasse<sup>4</sup> remarks that its depth is extremely variable, but nowhere exceeds three lines.

Croup usually subsides after the occurrence of a single process of exudation; but cases are recorded where the inflammation has continued until the formation of a second, and even a third adventitious membrane. It is not therefore improbable, in the examples given by authors, where the albuminous deposit equalled two or three lines in thickness, that several successive layers had been poured out, during the severity and continuance of the inflammation.

<sup>1</sup> Dictionary of Prac. Med. p. 531.

<sup>2</sup> Dictionary of Prac. Med. p. 531.

<sup>3</sup> Op. citat. p. 135.

<sup>4</sup> Ut supra, p. 278.

Examples of the great extent of the false membrane are given by different writers. Bretonneau<sup>1</sup> gives several instances of its extending in a connected and uniform layer, from the epiglottis to the rami of the bronchial tubes. Briqueteau,<sup>2</sup> Dr. Ryland,<sup>3</sup> and Prof. Horner,<sup>4</sup> of our own country, give instances of a similar extensive pervasion of the plastic exudation.

The post-mortem appearance of the mucous membrane, subjacent to the membranaceous deposit, varies according to the intensity and duration of the disease. In the acute form of the affection, and particularly where death takes place early, the lining membrane of the larynx and trachea is inflamed, and sometimes even of a vermilion hue, throughout the greatest part of its extent. In other instances, and at a later period, it is found paler, and presenting in color a rosy tint only. Still later, as in the last stages of the disease, the redness of inflammation will have disappeared, and the mucous membrane will present its natural pale color. On this point, Dr. Ryland<sup>1</sup> has very properly observed: "It is not always possible to determine, from the results of an examination of the dead body, what was the state of parts before the final

<sup>1</sup> *Traité de la Diphtherite.*

<sup>2</sup> *Ryland* p. 131.

<sup>3</sup> *Op. citat.* pp. 135-36.

<sup>2</sup> *Précis du Croup*, p. 274.

<sup>4</sup> *Pathological Anatomy*, p. 310.

change took place, and this is especially the case with regard to inflamed membranes; in puerperal peritonitis, for example, which is unquestionably an inflammatory disease, and one the symptoms of which cannot readily be mistaken, how often do we find the peritoneum free from redness? The same observation holds good with regard to inflammation of the skin, the redness which exists antecedent to death vanishing most completely on the occurrence of that event. \* \* \* \*

“It happens but very rarely that we have an opportunity of examining the state of the membrane in the first period of croup, before the formation of the albuminous concretion; and it is on this account, in a great measure, that we seldom find any vivid injection of the parts, for the secretion of the lymph weakens the inflammation most commonly, and in the end puts a stop to it entirely.”

It has before been stated that croup is a disease of childhood, that it is essentially inflammatory in its nature, affecting especially the secretory surfaces of the larynx and trachea. But the question here occurs, and it is one which many able pathologists have endeavored to elucidate,—why does the inflammation of croup differ from the laryngeal and bronchial



inflammations incident to childhood, and which affect the same parts with this disease? Since the experiments, instituted by Jurine, Schmidt, and other essayists at the concours of Napoleon, to produce artificial croup in the lower animals (they having succeeded in producing a false membrane in the air-passages of young animals only), many pathologists have adopted the opinion that the peculiarity of the product in the inflammation of croup, is attributable to an excess of albumen in the blood of young children.

Dr. Copland, who strongly advocates this theory, affirms that he has "uniformly observed the fact; namely, that the quantity of fibrine and crassamentum in the blood taken from the patient, and of albumen in the urine, have been great in proportion to the inflammatory type of the disease, and the disposition to form a false membrane." On the other hand, Ryland, Williams, and other writers on the disease, attribute the peculiarity of the product of croup to the circumstance of the inflammation being more deeply seated than that of bronchitis; namely, in the cellular tissue that enters into the composition of the mucous membrane—from the secretory arterics of which the albuminous exudation is secreted. Although in most cases of croup the sub-mucous cellular tissue is infiltrated with

serum, the effect of inflammation, yet according to Rokitansky,<sup>1</sup> it is not so, in all fatal cases of the disease. It is therefore an unsettled question in the pathology of croup, whether the albuminous product is owing to some peculiarity in the nature of the inflammation, or in the structure which is the subject of it.

<sup>1</sup> Op. citat. p. 22.

## CHAPTER II.

## LARYNGEAL AND TRACHEAL CROUP.

IN the preceding pages, I have taken a brief view of the opinions entertained by some of the best authorities, with regard to the nature and pathology of croup.

I have also alluded to my own views as to the unity of the disease, and the nature and origin of the product which constitutes its distinctive characteristic; and I have endeavored to show, that the commencement of that exudative inflammation of the respiratory passages that occurs in true croup, is invariably in the upper portion of these tubes, and that the morbid action extends only from above downwards.

Guided by this view of the seat, progress, and pathology of croup, and an extensive experience in the topical treatment of other diseases of the air passages, I adopted the determination several years ago to make the attempt in croup, whenever opportunity should offer, to arrest the exudatory inflammation, and thus prevent the

formation of a false membrane ; or, when formed, to promote its separation and consequent expulsion by the employment of topical applications to the mucous surfaces of the fauces, larynx, and trachea.

A part of the results of these efforts will be found in the history of the following cases.

In the treatment of croup with topical remedial measures, I have always employed a solution of the nitrate of silver, as, in my opinion, there is no known therapeutic agent, which for safety, efficiency, and certainty of action, can compare with the crystals of the nitrate of silver, in the local treatment of laryngeal, tracheal, and bronchial affections.

In preparing the solution, the pure crystals should be employed, and not the fused or solid nitrate, as the latter is much more likely than are the crystals, to contain the nitrate of potash, or copper, or lead in combination. A solution of the crystals, of the strength of from two to four scruples of the salt to an ounce of distilled water, when applied freely to the mucous membrane, does not act, as has been supposed, by burning, or by a destruction of the textural matter. It forms, immediately, an union with the albumen, and other secretions of the mucous lining ; whilst it operates, at the same time, to

produce a most favorable change in the vital action of the parts.

The first favorable opportunity which presented itself for the employment of nitrate of silver, as a topical remedy, in croup, came under my notice in November, 1842.

#### CASE I.

On the evening of the 20th of November, 1842, I was called to see John S——, aged three years, the son of a widow woman in this city. He was in the last stage of croup, having been attacked with the disease about a week previous to the time of my being called. Catarrhal symptoms had preceded, for several days, the full development of the croupal stage.

The ordinary remedies had been employed, but without arresting in any degree the progress of the disease. The great prostration, the stridulous respiration, and other symptoms of threatened suffocation, which were present, indicated the stage of collapse, and that no relief could be expected from the employment of common means. Under these circumstances, I proposed the cauterization of the larynx, with the hope that some relief might be obtained from this operation.

The proposition being acceded to by the friends of the little sufferer, I proceeded at once to apply a solution of the nitrate of silver, of the strength of twenty grains to the ounce of water, freely to the fauces, and into the cavity of the glottis. The application was followed by a violent expulsive cough; by which a large quantity of ropy mucus was discharged. Considerable relief followed this operation; the respiration became much less embarrassed, and so continued during a greater part of the following night. Towards morning, however, the croupal symptoms recurred with much violence, and when I saw my patient at an early hour the next day, the prognosis appeared so unfavorable, that I did not deem it advisable to renew the application.

The patient died the same day. No examination of the body was made.

This case is adduced as being the first instance, in my practice, where a successful attempt had been made to introduce the nitrate of silver into the larynx of a child affected with croup. During a period of nearly four years, previous to this time, as may be seen by referring to my work on Diseases of the Air Passages, I had been constantly using this remedy, locally,



in chronic laryngeal and bronchial diseases of adults.

But up to this period, such were the prejudices against its employment, and such the scepticism of a large proportion of the profession on the subject of topical applications to the larynx in cases of adults even, that hitherto I had not ventured upon its use in the treatment of disease in young children. The marked relief which for a time followed its employment in the above case, although adopted as the "ultimum remedium," in the hopeless stage of the disease, and the small amount of irritation caused by the application, encouraged me to repeat the remedy on subsequent occasions.

#### CASE II.

*Oct. 19, 1845.*—I received a message to meet two medical gentlemen of this city in consultation, in the case of an interesting little daughter of Mr. H., who was reported to be dying of croup.

On repairing to the house, I found the medical attendants in waiting, from whom I received the following history of the case. The little patient, who was three years old, had been suffering, for several days previous to the attack of



croup, from a hoarse cold, which was attended with a dry, barking cough. No alarm, however, was awakened in the minds of the parents until the evening of the 18th, when the child was suddenly and violently seized with croup. The family physician was immediately called, by whom the usual remedies were promptly employed. No relief, however, following these measures, a consulting physician was called the next day, and other active measures were adopted. But the disease progressed with great rapidity until the evening of the 19th, at which time I was called.

On entering the room, I found the child struggling for breath, for respiration seemed to be performed with the greatest difficulty. The head was thrown back ; the lips and face were livid ; and the whole countenance was expressive of the greatest anxiety. It was proposed that I should attempt to cauterize the larynx ; but so near suffocation did the child at this time appear to be, that I declined attempting to perform the operation, unless the attending physician would state to the friends of the patient its present hopeless condition ; for I feared that the impending fatal termination, which seemed so likely to follow, might be attributed to the effects of the application. This was done ;

and, at the request of the father of the child, and the medical attendants, I proceeded to apply a strong solution of the crystals of nitrate of silver (forty grains to the oz. of water), to the interior of the larynx. To effect this, the head of the child, thrown back, was held firmly by an assistant, the tongue depressed, and a small, round sponge, fastened to a bent probang of whalebone, and dipped in the solution, was passed over the top of the epiglottis, and pressed suddenly downwards and forwards, into the cavity of the larynx. A convulsive cough followed this operation, and a large quantity of dense, adhesive mucus was discharged, in which traces of the false membrane were observed; and, adhering to the sponge, also, were found fragments of the same albuminous concretion. The respiration, soon after this, was in some degree relieved, the countenance was not so livid, and there was less jactitation. After a delay of nearly two hours, during which there was no increase of the distressing symptoms, the application was repeated. The same results followed the second application, that attended the first; and the embarrassed respiration was decidedly more relieved.

The second cauterization was made at eleven o'clock in the evening. One grain of calomel

was ordered every three hours during the night, and I was requested to meet the attending physician at an early hour the next morning, and renew the application.

At 7 o'clock, the hour of consultation, the next morning, although we found our patient still oppressed by the impeded respiration, yet the breathing was slower, the countenance less anxious, and in no respect was she worse than when we left her the night previous. It was concluded to repeat the cauterization, and the nitrate of silver was again applied freely about the fauces of the child, and to the interior of the larynx; and at this time was the operation followed with even more relief than had attended the previous application.

I did not see the patient after this time, and the subsequent history of the case was furnished me by the attending physician, who stated, in substance, as follows :—That after the application of the nitrate of silver, in the morning, the child discharged a great quantity of ropy mucus, and appeared more relieved of the croupal symptoms than at any time before. At 12 o'clock, when he called, he found the little patient sitting up in the cradle, breathing with more freedom, and “looking as if she might recover.” These favorable symptoms continued

until three o'clock, when the hour came for administering the grain of calomel, which, at longer intervals, was still continued.

In doing this, the child resisted with considerable violence; and, caused either by the efforts of the patient, or the irritation of the medicine, this was followed by a spasm, and a return of all the unfavorable symptoms; and these continuing to increase, the death of the child took place a few hours afterwards.

I have always been of the opinion that this case would have terminated favorably if it had not been for the occurrence of the above untoward circumstance.

An examination of the body was requested, but could not be obtained.

It is well known that marked remissions of the unfavorable symptoms will not unfrequently occur in some cases of croup; and this is particularly true with regard to that form of the disease which early assumes the spasmodic character.

But the almost entire relief which for a time followed the employment of topical medication in the suffocative and hopeless stage of the two preceding cases, was certainly unusual, and led to the conclusion that the same measure might prove quite successful if adopted in the access

of the disease, or before the exudative inflammation had extended into the trachea and the bronchial divisions. By the occurrence of the following cases the opportunity was presented for the local employment of nitrate of silver in the early stage of the affection.

### CASE III.

Several years ago, a son of Mr. and Mrs. W. of Franklin Street, a fine healthful child of four years old, was attacked with membranous croup, and, notwithstanding the most energetic measures were adopted, died of the disease after a few days' illness. Some time after this, another son, only a little younger than the first was at the time of his death, was similarly attacked, and died of the disease in about the same period of time. In November, 1847, the only remaining child of these parents, an interesting daughter of eighteen months old, was violently seized with the same disease of which her brothers had previously died. Several hours after the occurrence of the croupal symptoms in this case, very late in the evening of Nov. 20th, 1847, I was called to see this child, and found her exhibiting all the symptoms of a severe attack of membranous croup. The heated skin, the fre-



quent, oppressed, and stridulous respiration, the dry and ringing cough, "tussis clangosa," and the appearance of the tonsils and pharynx, which were highly inflamed, and coated with an albuminous exudation, left no room to doubt the nature and the stage of the disorder.

For two or three days before the disease had merged into true croup, the child had been laboring under catarrhal symptoms, which were attended with hoarseness, and a dry, hard cough.

Immediately on my arriving at the house, and finding the patient in the above condition, I determined to try the effect, in this early stage of the disease, of remedies applied directly to the inflamed mucous surfaces. But in order, at the same time, to secure the aid of general remedies, I ordered the administration of a few grains of ipecacuanha, and, after waiting several minutes, followed the medicine with the application of the sponge dipped in a solution of nitrate of silver, of the strength of forty grains to the ounce of water. With this, the fauces, pharynx, and the laryngeal face of the epiglottis were well cauterized, and at the same time the sponge, wet with the solution, was carried into the larynx.

As in the preceding cases, this operation was

followed by a cough, and an effort at vomiting; by which a large amount of glairy, adhesive mucus was discharged, commingled with which shreds of the false membrane were distinctly visible. Within fifteen minutes the child breathed with more freedom, and there was an equally favorable change in the dry and ringing cough. Expecting to repeat the application, I remained a short time with the patient; but there was such an improvement in all the croupal symptoms, that no further application of the caustic was made that night. Five grains of calomel were directed to be given to the child; an emetic of ipecacuanha and tartarized antimony was ordered to be administered in the course of the night, if at any time there should be an increase of the peculiar symptoms of the disease.

At an early hour the next morning I visited my patient, and found she had passed a night of comparative comfort. The respiration was not so laborious as when I left on the previous evening, the cough was less croupal, and the heat of the surface was greatly diminished. The calomel had moved the bowels, and as the patient continued to improve during the night, the emetic was not given.

The same favorable indications continued during the day; but about nine o'clock that



evening a message was received from the alarmed parents, requesting my immediate attendance, for their child, as the messenger reported, was suffering from a return of the croup. I found a recurrence of the same symptoms that had been present the preceding evening; but they were much less in degree, and a single application of the nitrate of silver to the larynx which I made at once, relieved in a short time the embarrassed respiration, and lessened the croupal cough.

The patient again passed a comfortable night, and the next day when I called, she appeared quite cheerful, and apparently almost free from disease. From this time no further medication was needed; the child has since passed through a severe winter without the recurrence of any symptoms of laryngeal disease.

The above case occurred in a family whose children were predisposed to the disease; and in its access and development, the affection presented all the symptoms of true, or membranous croup. With the exception of the small doses of ipecacuanha and calomel which were given on the evening of the attack, no other means were used but the local employment of a strong solution of the crystals of nitrate of silver to the seat of the disease.

During the months of February and March

of the present year (1848), the occurrence of croup among children, in this city, has been more than ordinarily frequent. This is to be attributed, undoubtedly, to the epidemic influence of the atmosphere, which, for some cause, has been in a condition to favor the development of influenza, and other diseases of the respiratory organs, in adults, and of croup in children.

The following cases appeared during this period, and also took place in a family where croup had before occurred, and in one or two instances had proved fatal.

#### CASE IV.

At a late hour in the evening of the 23d of February, the Rev. Dr. B——, of this city, called at my office and desired me to accompany him, to see his little daughter, a child three years of age, who that evening had been violently seized with an attack of croup.

She had been hoarse, and had had a rough, dry cough for several days previous to the full development of the affection. When I saw her a few hours after the occurrence of the disease, the symptoms of croup, which were present, were marked and severe,—indeed, as I entered

the hall of the house, the ringing cough and stridulous respiration of the child—sounds which no physician ever desires to hear a second time, were distinctly audible through the closed doors of the chamber above.

With the aid of Dr. J. Hancock Douglas, who was in my office when the father of the sick child called, and who accompanied me to his house, I succeeded in obtaining a good view of the throat of the little patient. The parts were highly inflamed, and the tonsils were covered with an albuminous exudation. The barking cough and the embarrassed and tracheal respiration plainly indicated the stage of the disease, and that the inflammation had extended to the larynx, and about the vocal chords.

As no time was to be lost, I immediately administered ten grains of ipecacuanha, and after waiting fifteen minutes, prepared to cauterize the diseased parts.

Assisted by Dr. D——, I applied a solution of the nitrate of silver (forty grains to the ounce) to the fauces and pharynx, and also introduced the sponge saturated with the solution, into the cavity of the larynx. The introduction of the instrument was followed by a free discharge of muco-fibrinous matter, in which, and also on the

sponge, were shreds of the membranous deposit.

The little patient, very soon after the operation, appeared greatly relieved.

We remained nearly an hour after the application, in order to repeat it if the symptoms should indicate its necessity ; but the child continuing to improve, we left for the night, after giving directions to have an emetic of ipecacuanha administered should there be any increase of the embarrassed respiration. Soon after we left the child fell asleep, and although the breathing was labored, and the cough, which occurred often during the night, was croupal, yet she slept for several hours, and when I called the next morning, I found a great improvement in all the above symptoms. The emetic had not been given. As there still appeared to be some inflammation about the throat, and the cough retained the peculiar sound of the disease, I had fears that there might be a return of all the unfavorable symptoms before night, and therefore concluded not to wait, but to repeat the application of the nitrate of silver to the diseased organ. This was done, and I feel confident the operation was attended with much advantage, for instead of having a recurrence of the croupal symptoms on the second night, as had

occurred in a former instance (Case iii.), and which is so likely to follow a remission of the disease in most cases, there was a constant improvement of all the croupal symptoms during that day, and the following night was passed with equally favorable indications.

In short, after this date no further medication was needed, for the child rapidly recovered.

#### CASE V.

While in attendance upon the above case, a second child in this family, a little daughter, nearly eight years of age, was likewise attacked with the disease.

It had been observed by the mother, that she, like her younger sister, had been hoarse with a severe cough for a number of days. For these symptoms, occasional doses of syrup of ipecacuanha, or of Hive syrup, had been administered by the parents. But notwithstanding the use of these expectorants, croup supervened on the above symptoms, which, although well marked, was not developed with quite that degree of severity that attended the onset of the disease in the preceding case. Being at the house soon after the access of the disease, I applied the

cautery immediately to the inflamed mucous surface of the throat and larynx.

It will be unnecessary to repeat the details of the treatment in this case. Two applications only were made on the evening of the attack, and one on the following day. The only general remedy administered, was a laxative dose of calomel. The croupal symptoms, which were greatly lessened by the first and second applications, disappeared altogether after a single employment of the local remedy on the second day.



## CHAPTER III.

## MEMBRANOUS CROUP, COMPLICATED WITH BRONCHIAL INFLAMMATION.

THE preceding cases of croup, with the exception perhaps of the first, may be termed instances of laryngeal, or tracheal forms of the disease. The bronchial variety, or that form of croup which is complicated with inflammation of the bronchial tubes, is described by most authors as commencing with catarrhal symptoms. There is, soon after the access, and in some instances from the invasion of the disease, a croupy character of the voice, dependent upon the exudative inflammation which distinguishes it from a purely catarrhal or bronchial affection. This distinction, be it remembered, is not founded upon any pathological difference in the nature of croup, for it is maintained that the peculiar inflammation of croup has its origin in the superior parts of the respiratory passage; and that this inflammation, if continued, will extend not only along the trachea, but into the ramifi-

cations of the bronchi; and we then have the sibilous respiration, the suffocative cough, and the lividity of the countenance, which distinguish this complicated form of the disease.

The danger of an unfavorable termination, it is considered by Ryland and others, will be in proportion to the rapidity with which these several stages follow each other.

Although the chances of success, in the employment of the nitrate of silver as a topical remedy, are greatly diminished when the exudative inflammation has extended into the bronchi, yet, as the application of it does not preclude the adoption of other measures, its employment, even when there is a predominance of bronchial symptoms, should in no wise be neglected.

In the following case, though unsuccessfully employed in the advanced stage of a case of bronchial croup, yet such was the effect of the nitrate of silver, in mitigating the croupal symptoms, and in relieving the oppressed and stridulous respiration, as to encourage perseverance, and awaken hopes of final success, in some cases of the complicated variety.

#### CASE VI.

*Feb.* 28, 1848.—Was requested to meet Dr.

Spears, in consultation, in a case of croup, in the daughter of Mr. N., of Sidney Place, Brooklyn.

This child, aged two and a half years, had exhibited, as I learned from the attending physician, symptoms of croup complicated with catarrhal or bronchial disturbance, for nearly a week before the full manifestation of the disease. During the last twenty-four hours all the symptoms had become greatly aggravated, notwithstanding appropriate and energetic measures had been employed, by the attending physician, to check the progress of the disease.

I found the child oppressed with a most difficult and laborious respiration; there was great restlessness; the voice was reduced to a whisper; whilst the choking cough, the livid lips, the constant heaving of the thorax, and the sibilous respiration, indicated the complicated nature of the case, and the advanced stage of the disease.

After examining the case, I expressed my fears that permanent benefit would not follow the employment of topical remedies at that stage of the affection, especially as applications could only be made to a portion of the diseased membrane. As the attending physician and the parents were anxious to have a trial made, I

applied a strong solution of the nitrate of silver to the fauces, pharynx, and on both faces of the epiglottis; and then, after a delay of ten minutes, I passed the sponge of the probang through the aperture of the glottis, and freely cauterized the interior of the larynx. For a few moments the cough was more violent, and the respiration appeared more embarrassed. But during this time, a large quantity of muco-purulent matter was discharged, or was wiped from the mouth of the patient, commingled with which were many patches of false membrane.

The respiration, soon after this, was much easier; but more especially was this the case, after a second application, which was made in the course of half an hour, and which was followed by a like free discharge of viscid, yellow mucus, and a decided improvement in the choking, croupy cough, and respiration. Indeed, although this patient did not ultimately recover, the symptoms of tracheal croup were at no time thereafter so severe, as before the nitrate of silver had been applied to the parts.

These applications, conjoined with appropriate general treatment, were repeated at intervals for several days, and always with more or less relief to the embarrassed respiration; but the bronchial affection continuing, pulmonic inflamma-

tion supervened, and the child sank under the disease, and died on the thirtieth of the month, although the peculiar symptoms of croup, as the attending physician informed me, had nearly disappeared before the death of the patient.

I have alluded to the difficulty of reaching the whole surface of the diseased membrane, where, as in the preceding case, the exudatory inflammation has extended through the larger bronchi into their minute ramifications. But, even when this is the case, we should not be deterred from the employment of the nitrate of silver as a topical remedy, if it shall be found that, when it can be applied, its influence upon the mucous membrane is always salutary; for, it is now an established fact, that a solution of nitrate of silver, of sufficient strength to arrest inflamed action, may be introduced in considerable quantities below the epiglottis of adults, and thus be diffused with certainty over the surface of the bronchial membrane.

Among the patients who during the last few years have come under my care, for the treatment of chronic, laryngeal, and bronchial disease, are a number of intelligent physicians. Several of them have informed me, repeatedly, that after having a few applications of the solution of nitrate of silver into the larynx, they have felt the



fluid distinctly extending down the bronchial tubes. Often, in these cases, no taste of the medicine would be observed, until matter, by coughing, was expectorated from the air-passages, when the peculiar flavor of the nitrate of silver—a most acrid bitter—would be perceived; and this would continue to be observed, whenever the individual expectorated, for many hours after the operation; thus conclusively demonstrating, as it did, to those gentlemen, that the solution had pervaded the bronchial divisions. Another point, connected with this matter, is the interesting fact, that much less mechanical irritation is produced by the application of the nitrate of silver into the larynges of young children, who are suffering from croup, than when it is introduced into those of adults, who are affected by chronic disease of the larynx.

In applying this remedy, in the preceding case, it was observed by Dr. Spears, with much surprise, and the same fact has been remarked by myself in other cases, that after the first application of the solution to its larynx, this child, as if fully conscious of, and seeking for the relief it afforded, would open her mouth to receive the probang, whenever the physician approached for the purpose of repeating the operation.



In the treatment of croup, therefore, where the plastic exudation has extended into the ramifications of the bronchi, or where the primary affection is complicated with bronchial disease, a still more free use of the solution should be employed, in order that some part of the fluid may find its way over the diseased mucous surface of the lesser branches of the air-tubes.

Acting upon this plan, the following case of croup, complicated with bronchial disease, was successfully treated by the topical employment of the nitrate of silver.

#### CASE VII.

In the early part of the spring of the present year, M. M. of this city called on me, and requested me to visit his little daughter, who, under the care of his family physician, had been sick with the croup for nearly a week, and was then dangerously ill.

One or two of his children had already died of croup, and the array of symptoms which I found here presented, indicated an equally unfavorable termination of the disease in the case of this child. From the history given, as well as from the symptoms present, I found that bronchial inflammation had become complicated

with the croupal affection soon after the attack. The symptoms present at this stage of the disease were not dissimilar to those that existed in the latter stage of the case last recorded. There was oppressed and stridulous respiration; the voice was reduced to a whisper; the characteristic croupy cough was present, but more suffocative and bronchial than when occurring in simple croup; and complicated with these symptoms were further indications of extensive bronchial disease. Throughout the left lung especially, of this patient, the sibilant respiration and other evidences of the affection were most apparent.

The ordinary general treatment usually adopted in such cases had been judiciously and perseveringly employed for several days by the attending physician, apparently without arresting in any degree the progress of the disease.

I proceeded at once to cauterize the diseased organs, and having applied a strong solution of the nitrate to the fauces, pharynx, and about the glottis, passed the sponge well filled with the fluid into the cavity of the larynx. As had occurred in other cases, this operation was followed by a free expectoration of muco-purulent matter, large quantities of which adhesive discharge were wiped from the mouth of the

patient, in which, and adhering also to the sponge of the probang were many small fragments of the false membrane.

These first applications were made about four o'clock in the afternoon; at eleven o'clock at night they were repeated, when other portions of the adventitious membrane were ejected; and within half an hour after the last application, there was a decided improvement in all these unfavorable symptoms.

As the child was greatly enfeebled, not only by the severity of the disease, but from the energetic practice which had been employed, a stimulating expectorant was the only remedy ordered; anodyne and slightly irritating fomentations were applied to the chest; and a bland, supporting diet was directed.

On calling at an early hour the next morning, the attendants reported the patient as having passed a better night than had occurred to her since the first attack of the disease; and the appearance of the child indicated a favorable change in all the unpromising symptoms. The breathing was much less embarrassed, the pulse and respirations were diminished in frequency, and the cough had nearly lost its croupy character.

The same plan of treatment was continued,

and from this period the patient recovered rapidly; and although it was several days before the voice was restored, yet vocalization returned, and the child was ultimately restored to robust health.

## CHAPTER IV.

## MEMBRANOUS CROUP COMPLICATED WITH SPASMODIC AND WITH BRONCHIAL SYMPTOMS.

IT has been stated in the preceding pages, that that form of croup which some writers have denominated the spasmodic variety, is in fact different from the true inflammatory croup only in this respect, namely, that in such cases there is a greater predominance of spasmodic and nervous symptoms, whilst, on the other hand, there is a tardier tendency to the formation of an adventitious membrane.

There is not a doubt, that in such instances as the following, patients are frequently cut off by the violence of the spasm before the plastic exudation has become in any degree condensed into a continuous membrane; and it is from an examination of the morbid appearances manifested in similar cases that some writers have been led to adopt the conclusion, that there exist two distinct forms of the disease, in the pathology of which there is an original and essential difference.

## CASE VIII.

On the night of the 1st of April, 1848, I was desired by Mr. Hall, of Amos Street, to visit his son, a fine healthy fat boy, five years of age, who had an attack of croup. The disease had come on after an unusual exposure to the cold easterly wind which had prevailed during the preceding day. Early in that day the child had been allowed to stand for an hour or more at an open window, engaged in watching some boys who were flying their kites near by, until he was quite chilled by the cold atmosphere. The attack of croup, as might be anticipated, in one predisposed to the complaint, followed this exposure. This case was first seen by me about three hours after the development of the disease. The symptoms at this stage of the affection were uncommonly violent. The cough was croupal; the face flushed; the respiration was accelerated, stridulous, and greatly oppressed; so much indeed was the breathing embarrassed, and so great were the struggles for breath, that it was with much difficulty that the child could be held in his mother's arms.

On examining the throat of the patient no patches of the false membrane could be discovered about the tonsils, but the whole faucial re-



gion was coated with a viscid exudation, and was, moreover, in the highest state of inflammation. Here then was a case where severe spasm existed in the early stage of exudative inflammation, before the fibrinous deposit had assumed a concrete form. Every physical or rational symptom of true membranous croup was manifested in this case in a prominent degree, except the formation of the pellicular membrane, and this unquestionably would have been deposited in a short time if the morbid action had not been arrested.

In order to excite vomiting the Syrup of Ipecacuanha had been administered to the patient before my arrival, and at the suggestion of an officious neighbor, this had been followed by an infusion of lobelia, but no effect had been produced by either of these remedies.

Finding the symptoms so urgent—for immediate suffocation seemed impending—I determined to try at once and relieve the spasm by local applications to the larynx of the patient. Directing the child's head to be properly confined, I depressed the tongue, and passed a sponge saturated with a strong solution of the nitrate about the fauces and into the cavity of the larynx. A large quantity of ropy and adhesive mucus was quickly thrown off after the application. In a

few minutes the respiration was less suffocative, but not until after a second application, which was made within twenty minutes of the first, was the relief marked and decisive. In less than half an hour after the second thorough application of the solution to the diseased parts, the child fell asleep, breathing comparatively with but little difficulty.

On calling the next morning to see my patient, he was found looking pale but cheerful, and was engaged at his play. He had passed the latter part of the night in a quiet sleep. His voice, although sounding hoarse when he coughed, was nearly restored ; his pulse was natural, and his respiration almost wholly unembarrassed. The emetic had not been administered, nor was any other medical agent whatever employed in this case, after I was called, but the local application of the argentine solution to the mucous surfaces of the fauces and larynx. The recovery was rapid and permanent.

In this connexion, I shall detail the treatment of but one other case of membranous croup as having come under my own immediate observation.

The interest connected with the following successfully treated case of membranous croup is enhanced by the fact that besides being one

of the most severe and complicated cases of the disease that I have ever encountered, its progress, treatment, and the effect of the treatment employed, were observed by several intelligent physicians, not one of whom considered it possible to save the life of the child by means ordinarily employed in the treatment of croup.

#### CASE IX.

The daughter of Mr. Griffin, of Hudson st., came under my care for the treatment of croup, April 26th, 1848.

This child, who was three years and one month old, had been affected with a severe cold, which was attended by a hoarse cough for a whole week before the occurrence of the suffocative and alarming symptoms which characterize the full development of the disease. I was called to see this child on the morning of the 26th, and found the catarrhal symptoms present as above named. The hoarse cough, the heated skin, the restlessness, and the increased respiration of the child, awakened in my mind the suspicion that the patient was threatened with an attack of membranous croup.

Small doses of calomel and ipecacuanha were ordered every three hours during the day, these

to be alternated with a weak solution of tartarized antimony. But I failed to do what should not have been omitted at this visit, namely, to examine the throat for the purpose of ascertaining the presence of the false membrane, if it existed; for I doubt not from the subsequent course and character of the disease, that its presence about the tonsils could have been detected at this stage of the affection.

About 8 o'clock of the following evening, I was sent for in great haste to see the child, and found her laboring under a most violent and fully developed attack of membranous croup. The flushed countenance, the accelerated pulse, the ringing cough, the oppressed and stridulous respiration, and the appearance of the fauces, which were entirely coated with a membranaceous deposit, made it impossible to mistake the nature or the grade of the disease.

The medicine being at hand, I immediately administered an emetic dose of ipecacuanha and antimony, and after a delay of fifteen minutes, the patient not vomiting and the respiration being greatly embarrassed, I proceeded to employ cauterization. A sponge dipped in a strong solution of nitrate of silver was applied to the tonsils, the mucous membrane of the pharynx, and then passed rapidly over the laryngeal face

of the epiglottis and into the larynx itself. This operation was followed by immediate vomiting, and the ejection of a large quantity of tenacious, glairy mucus from the air-passages, in which could be seen many broken portions of the false membrane.

After a few minutes, the patient breathed with more freedom ; but this partial relief continued for a brief time only, for at the end of half an hour the cough became more stridulous, and the respiration more embarrassed than it was before the application of the topical remedy. An emetic of sulphate of zinc in combination with ipecacuanha was now administered, by which full vomiting was produced.

As no permanent relief, however, followed these measures, but the disease on the contrary appearing to advance, I proposed a consultation, and Dr. Cox, of Union Place, was called.

It was concluded in consultation to continue the topical applications, to administer small and frequently repeated doses of tartarized antimony, and to give two grains of calomel every second hour. The second cauterization was made at 10 o'clock, which brought away an increased amount of the adhesive mucus, and many shreds of the pellicular formation. The antimony, although given in large doses during the night, did not produce vomiting. This was



only effected by administering the zinc and ipecacuanha, and whenever the above combination was given, it never failed to act as an emetic.

A third application of the caustic was made a little before midnight, and my assistant, Dr. Douglas, remaining with the patient through the night, repeated the cauterization for the fourth time, about two o'clock in the morning. At each application much mucus was discharged, commingled with which were many portions of the adventitious membrane. In every instance the operation was certain to be followed by a mitigation, to a greater or less extent, of all the distressing symptoms—the difficulty of breathing, the quickened pulse and respiration, would be for a time greatly diminished; but not until after the fourth application, did this relief continue for any length of time. When I returned to the patient at five o'clock the next morning, I observed a marked change in the symptoms that were present. The croupal cough and the stridulous breathing were much lessened, but on the other hand, the increased heat of the surface, the bronchial cough, and the widely diffused râles, which were revealed by auscultation throughout both lungs, indicated too plainly that the exudative inflammation had extended into the bronchial terminations.



At the consultation held soon after my first visit this morning, it was concluded to have a few leeches applied between the shoulders of the patient with the hope of arresting the bronchial inflammation : to continue the calomel, and to repeat the topical measures during the day should there be an increase of the croupal symptoms. During the early part of the day, the case appeared to be somewhat improved by the bleeding and the other measures adopted ; but towards night, the croupal symptoms returned with more violence than ever ; and complicated with this we had extensive bronchial disease, occupying both sides of the chest. A blister was applied over the sternum, the topical applications were renewed, and the patient again vomited with the mineral emetic. Many portions of albuminous matter were again ejected by these measures, which served to relieve greatly the stridulous breathing ; but by 10 o'clock at night, the respiration became more bronchial and rapid, the pulse was increased in frequency, and feeble ; and although the croupal symptoms were decidedly relieved by the local applications, yet the little patient appeared to be fast sinking under the suffocating effects of the bronchial disease. In consultation with Dr. Cox it was concluded that depletion, even by vomiting, could be carried no further, and that the spasm

and bronchial irritation must be relieved, if at all, by other measures. It was decided, therefore, to continue the cauterizations as required, and to administer the Hydrocyanic Acid, in drop doses, every two hours. The excellent effects of this latter remedy were soon apparent. After two or three doses had been swallowed, the great restlessness, the almost constant suffocative cough, subsided greatly, and the ejection, after an application of the caustic, of a much larger amount of fragments of the false membrane than had before been discharged, afforded the greatest relief; so that towards morning, the child fell asleep, and for two hours slept quietly, and breathed with considerable freedom.

The next day the child appeared much prostrated, but the croupal symptoms had nearly disappeared, and the bronchial irritation was greatly lessened.

The Hydrocyanic Acid was continued for several days. Appropriate supporting means were employed, under the use of which the little patient was gradually restored to health and strength.

But notwithstanding convalescence took place in other respects, yet vocalization did not return till nearly eight weeks after the attack of the disease.

Pathologists have observed that croup usually

subsides after the occurrence of a single process of exudation ; but cases are recorded where the inflammation has continued until the formation of a second, and even a third adventitious membrane.

Such was the severity and persistence of the exudative action in the preceding case, that, as we had every reason to suppose, several successive layers of albuminous matter were formed in the larynx, and removed by the applications. Repeatedly, during the period of the greatest severity of the disease, after these cauterizations were made, many patches or fragments of the false membrane, some of considerable size, were at each time ejected from the air-passages. This occurrence was always followed with relief to the patient, and this relief would continue until the deposition of another membranous coating had taken place.

I shall conclude, for the present, my record of observations, by noticing a few cases of membranous croup which, in the hands of other members of the medical profession, have been successfully treated by means of the topical application of the nitrate of silver.

Within a few days the subsequent highly interesting case was communicated to me by my friend, Dr. James Bryan, of Philadelphia.

## CASE X.

*“ Dear Doctor,*

“ The following case of membranous croup, cured by the application of nitrate of silver, I send to you in accordance with your request. You are at liberty to make whatever use of it you may think proper.

“ On the 21st of April of the present year, I was called upon by my friend Dr. T. Beasley to see with him the only child of Thomas Hutchinson, aged 14 months, laboring under an attack of croup.

“ Dr. B. informed me that this was the third day of the disease, and that the child had gradually grown worse, until the disease assumed the features presented at this visit.

“ I fastened on the extremity of a properly bent whalebone a conical piece of sponge, and prepared a solution of the nitrate of silver, 40 grains to the ounce of water. At seven o'clock, P. M. the child was lying on its back with the head thrown backwards spasmodically, and breathing with the greatest difficulty; the lips livid, the pulse small, thready, and very quick; a peculiar whistling sound was produced by the imperfect act of respiration. The fauces and throat, as far as vision, aided by depressing the

tongue, would extend, were covered by a white, milky, sheet-like covering. The child was placed on the father's lap, the head supported by Dr. B., when I depressed the tongue by means of the bent handle of a silver spoon, and introduced rapidly into the larynx the sponge, saturated with the solution.

“For an instant the spasm of the glottis produced apparently complete closure. This, however, was followed by relaxation, and a copious discharge of mucus, with long membranous shreds, which relieved the respiration very much.

9½ o'clock, P.M.: The child has vomited freely in the interim, and respiration is some better. The application was made again, and was followed by a temporary spasm, and a copious discharge of a flaky and stringy mucus, as white almost as milk. A little blood was found mixed with it, which came apparently from the nose, which has been discharging blood every now and then since the commencement of the disease.

22d, 8 o'clock, A.M.: The child has passed a tolerably easy night. Free bilious discharges have taken place from the bowels, produced by the use of two grains of calomel taken every two hours since yesterday morning. Respira-



tion now is comparatively easy, the head is not thrown back as before, nor are the lips so livid. The child is enjoying a quiet sleep. The pulse is about 90, and regular. Ever since the first application, it has drunk freely of cold water, which it did not before.

The third application into the larynx produced less spasm, and very little irritation, but it was followed by a very free expectoration of the same kind of shreddy and membranous substance, with a large amount of mucus. Continue the calomel two grains every few hours.

7 o'clock in the evening: The child has had four stools during the day, is now lying languidly on the pillow with its chin raised, but quiet. Respiration dry and difficult.

"On account of the excitement of the child, the first attempt to cauterize the larynx was not successful, and it produced, which in fact is always the case, considerable spasm. The second attempt was perfectly successful, the sponge passing down more than two and a half inches, bringing up with it a quantity of white membranous mucus, and followed by a discharge of a large amount of the same kind of matter, almost without any effort of the child, who threw his head back, breathed easily, and went to sleep in a very few seconds.



23d, 8½ o'clock A.M.: The respiration comparatively easy, slept well last night, has had four bilious stools. It is so much easier that we resolved not to apply the caustic at present, but to hold ourselves ready to do it during the day, should there appear immediate necessity for it.

“6 o'clock P.M.: The child was sitting up on its mother's lap, amusing itself with toys. A quantity of coagulated blood fills up the right nostril. Respiration but slightly stridulous; has eaten bread and milk; had three stools since morning, and has slept very comfortably. The throat, as far as can be seen, is perfectly free from the *diphthérite* deposit. Continue calomel, half a grain every four hours, with one grain of Quinine.

“24th: Saw the child this morning with Dr. Beasley. It was lying comfortably in the cradle; very little impediment to the respiration; has slept well during the night, taken nourishment, and passed three stools. The throat shows no appearance of deposit. The calomel diminished to one eighth of a grain every four hours. The consultation to cease.

“It will be recollected that no emetic or other remedy than a few grains of calomel and the nitrate of silver has been administered in this

case until last night, when the Quinine was added. The patient recovered without an unfavorable symptom."

The history of Case II., which is recorded on page 31 of this work, was given at a meeting of the "New York Medical and Surgical Society," November 1st, 1845, and the members present were desired to make trial of the local remedy whenever opportunity for employing it in croup might occur.

The next year a member of the Society, Dr. Wm. N. Blakeman of this city, reported to the Society two cases of croup which had been treated successfully by topical medication.

The details of these cases are recorded in the twenty-third number of the New York Journal of Medicine.

The first case, which is that of a large fat child two years old, and of a leuco-phlegmatic temperament, was seen by Dr. B. five hours after the attack. The skin at this time was hot and dry, the pulse quick, with great restlessness, laborious breathing, and the hoarse barking or crowing sound peculiar to croup. The tincture of sanguinaria with squills, and ippecacuanha, were first given, by which vomiting was produced, with no relief; six grains of calomel

were then administered and the former mixture repeated, with the addition of five grains of tartar emetic; free purging and vomiting were produced, but with no relief. On the second day persulphate of mercury was given in doses of a quarter of a grain every hour, by each dose of which vomiting was excited, but without relief. In the afternoon of the same day Dr. Blakeman resolved to try a strong solution of nitrate of silver. The application was made by means of a sponge, and the solution used contained a drachm of the nitrate to an ounce of water. The application brought away a quantity of tenacious membranous matter, and a larger quantity by the vomiting which soon followed. A second application was made ten minutes after, by which a still larger quantity was brought away, to the great relief of the symptoms. In five hours a third application was made with the same effect as to the discharge of membranous matter and the vomiting. The next morning the child was found entirely relieved from the disease.

In the second case, that of a boy six years old, with frequent pulse, skin hot and dry, breathing hurried and difficult, and loud crowing, the same application was made two hours after the commencement of the attack, when a discharge

of tough phlegm took place and vomiting. After a second application the relief was complete.

Within the last year several other cases of croup have been communicated to me by medical gentlemen residing in different parts of the country, in which they have succeeded perfectly and with great satisfaction to themselves in arresting the disease, by the use of the topical measures I have recommended. I shall, however, in this connexion subjoin the history of but one other case of membranous croup;—one which was successfully treated by Dr. C. E. Ware, of Boston, and was by him communicated to the Boston Medical and Surgical Journal. It may be found in the fourth number for December, 1847.

“I was called,” says Dr. Ware, “to this patient, a boy five years old, Saturday, November 20th. The mother said that he began to breathe hard just a week previous, but as he had been subject to attacks of spasmodic croup, in several of which I had attended him, and usually found ready relief, she felt no great anxiety, especially as there was less constitutional affection than he had in former attacks. His tonsils, also, had been for a year or more somewhat enlarged, and often gave a huskiness to his respiration and voice. On Tuesday he

began to cough, and evinced other signs of a cold. These symptoms continued, he playing about, and having appetite without anything very characteristic till Friday afternoon, when the cough began to have a ringing tone, and the respiration to be very labored. I was not called to him till the next afternoon. Then there was the characteristic breathing of croup well marked. It had become sufficiently distressing to occasion great restlessness and jactitation, but was not accompanied by much febrile excitement, nor as yet prostration. The general expression of the child was good. On examining the fauces they appeared red, and the tonsils presented distinct patches of lymph. On the backs there was an almost entire absence of respiratory sound, and no râles whatsoever. The breathing and cough were both dry, with very little râle in the trachea.

He was ordered strong mercurial ointment, and fomentation to neck, and pills of Dover's powder and blue pill once in four hours, and a syrup with opium and ipecac. at intervals between. Under the influence of the opium he got more sleep than during the previous twenty-four hours, but in the morning was no better, nor essentially different.

I now commenced the application of the ni-



trate of silver to the larynx, using a solution of the strength of a drachm to the ounce, and applying it with one of Dr. Green's whale-bone staffs. I applied it twice in the course of the first day. The child the first time resisted violently, and I was obliged to use much force. But after having been persuaded once to submit quietly, the operation occasioned so little irritation that he never afterwards made the least objection to it, but allowed me to perform it as effectually as I could have done upon a grown person. The first applications were followed by so such excitement that it was difficult to see what was the immediate effect. But afterwards, when he was more tranquil during the operation, it was obvious that it produced an increased dryness of the cough and respiration, without immediate relief or aggravation of the labor in breathing. In the course of the day he raised twice considerable pieces of false membrane, very well marked, and stained with blood, together with a great deal of very thick, tenacious mucus, which was also occasionally stained with blood. After the discharge of the false membrane the breathing became much easier, and was never again as labored as it had been before.

The next day, Monday, the respiration, al-



though improved, was still very laborious. There was yet great deficiency of respiratory sound in the backs, and absence of râles. After the application of the caustic, which was applied twice this day, the fauces appeared red, but there was no lymph visible. From this time the amendment, although slight, from day to day was constant, till Friday, the 26th. No lymph was seen upon the tonsils. The caustic was applied once a day. Friday night, the breathing was more labored than the night before, and Saturday morning I again saw lymph on the tonsils. Through Saturday and Sunday, however, he continued to improve, and Sunday evening uttered the first loud word which he had been able to speak since I had seen him. The caustic was now omitted, as well as all his medicines. His appetite, which had never entirely disappeared, became more urgent, and he was allowed to eat freely. Indeed, his diet had been liberal throughout. The respiratory sound gradually returned to the backs, but continued, as it had done throughout, free from râles. The voice continues to improve, but still retains its huskiness. The caustic was applied twice the two first days; afterwards but once a day, the sponge never being introduced more than once at the same visit.

## CHAPTER V.

## OF THE TREATMENT OF CROUP.

As these contributions to the pathology and treatment of croup are not intended to constitute a complete essay upon the disease, I shall not stop to describe the symptoms or to discuss the etiology of membranous croup, but shall proceed to a more critical examination of both the topical and the general remedies which are indicated in the treatment of this affection.

*Topical Medication.*—Believing as I do, that topical medication is a measure of the highest importance in the treatment of membranous croup, I shall make no apology for giving to it a more extended consideration.

M. Bretonneau was among the first to recommend and employ the nitrate of silver as a topical remedy in the treatment of membranous croup. He made use, however, of a very weak solution (four grammes of the salt to thirty-two grammes of water), and directed its application to be made to the throat and the opening of the glottis. The instrument he employed, and his method of application, are thus described in a

work by M. Berton, which has recently been published in Paris.<sup>1</sup> “L'appareil est composé d'une éponge fine de la grosseur environ d'une noix, fixée au bout d'une baleine assez forte et recourbée, à la chaleur d'une bougie, à 5 ou 6 centimètres de son extrémité et presque à angle droit. L'éponge est imbibée d'une solution de nitrate d'argent (au degré de 4 grammes de ce sel pour 32 grammes d'eau distillée). Elle est introduite dans le fond de la gorge ; l'épiglotte est soulevée et la solution exprimée au-dessus de la glotte.”<sup>2</sup>

It will be observed from the above extract that M. Bretonneau makes no attempt to pass the instrument below the epiglottis. The sponge attached to the probang, being saturated with the solution, is introduced into the throat, “the epiglottis is elevated (soulevée) and the solution expressed into the glottis.”<sup>3</sup>

The topical application of a solution of the nitrate of silver in membranous croup, has also been recommended by MM. Dupuytren, Trousseau, Guersant, Guet, Bouchut, and other French practitioners.

<sup>1</sup>Formulaire Thérapeutique, etc. Concernant les Maladies de L'Enfance. Article, Croup.

<sup>2</sup> Ut supra, p. 81.

<sup>3</sup> If the French anatomists will acquaint themselves with the position of the *living* epiglottis when in situ, they will find that this cartilage is always *raised*, except at the moment of deglutition.

M. Guet, in his Thesis published in 1843, on the treatment of croup,<sup>1</sup> thus describes the method—as practised by M. Guersant in the Hôpital des Enfants—for applying the caustic solution to the fauces, pharynx, and to the opening of the glottis in such a manner as to cause some drops of the solution to penetrate into the larynx. “L'éponge convenablement imbibée de la solution caustique, et le malade solidement maintenu par une ou deux personnes vigoureuses, l'opérateur abaisse la base de la langue, avec la main gauche, armée d'une cueiller ou de tout autre instrument; en même temps il porte avec la main droite, la baleine dans la bouche; lui fait traverser rapidement cette cavité; porte l'éponge dans le pharynx après l'avoir promennée sur les piliers et les amygdales, s'il y existe des fausses membranes; la fait glisser profondément dans cette cavité le long de sa paroi postérieure, de manière à la loger, si c'est possible, entre cette paroi postérieure et l'épiglotte; puis, quand il se sent arrêté par l'orifice supérieure du larynx, il presse un peu sur cette éponge, de manière à en faire suinter quelques gouttes de solution caustique, et à en faire parvenir un peu dans le larynx.”<sup>2</sup>

<sup>1</sup> *Considerations Pratiques sur le Traitement du Croup.* Par P. R. L. Guet, p. 22.

<sup>2</sup> *Op. citat.* p. 22.

The same author informs us that Professor Trousseau at the Hôpital Necker has employed with success a solution of the nitrate of silver as a topical remedy, in the treatment of a case of croup occurring in an infant of 20 months; but to what extent the applications were made, or of the exact strength of the solution employed, we are not informed.

M. Bouchut, whose work on Diseases of Children<sup>1</sup> was published in 1845, alludes to this case of M. Trousseau, and adds that two other well marked cases of membranous croup in private practice had been successfully treated, by means of the above local remedy. The strength of the solution as recommended by Bouchut, is ten grammes of the nitrate of silver to thirty grammes of distilled water. The instrument of the operator, and the manner of applying the caustic in pseudo-membranous croup, is thus described:—"Il faut avoir un petite éponge fine, solidement fixée au bout d'une baleine courbée en crochet; lorsque l'éponge est imbibée, on exprime légèrement et on la porte dans le pharynx et sur la glotte, afin que quelques gouttes du liquide caustique puissent pénétrer dans le larynx."<sup>2</sup>

<sup>1</sup> Manuel Pratique des Maladies des Nouveaux-Nés, et des Enfants à la Mamelle.

<sup>2</sup> Op. citat. p. 271.



The application of the caustic, says the above writer, should be made in the commencement of the disease, or as soon as we perceive patches of the false membrane about the pharynx, and it should be repeated at least twice in the twenty-four hours. But he observes, and recommends, great caution in making the applications to the pharynx and over the glottis, lest too large a quantity of the liquid should drop into the larynx, and produce suffocation and death; or, at least, render it necessary to practise immediate tracheotomy. The following are the author's remarks on this subject:—"Si la cautérisation de l'arrière-bouche et de la partie supérieure du larynx est avantageuse, elle a aussi ses inconvénients qu'il faut connaître pour tâcher de les éviter. La suffocation immédiate peut en être la conséquence, si l'on a laissé trop long temps l'éponge sur la glotte, et si une trop grande quantité de liquide a pénétré dans la larynx. Cet accident est fort grave, car il peut déterminer la mort, ou au moins la nécessité de pratiquer aussitôt la trachéotomie."<sup>2</sup>

Bearing in mind these dangers, and advising great caution in its use, M. Bouchut commends the employment of the nitrate of silver as an important medication in the treatment of croup.

<sup>2</sup> Op. citat. p. 272.



And yet, neither Bouchut nor his confrères, to whom allusion has already been made, derived that benefit from the use of the nitrate which they might have obtained, by carrying their applications directly into the diseased larynx, instead of making them, as they do, only to the pharynx and the superior opening of the larynx — “l’arrière-gorge et l’ouverture supérieure du larynx.”

In employing the nitrate of silver as a topical remedy in the treatment of diseases in young children, I have not deemed it prudent or necessary to use a solution of the caustic of the strength recommended by Bouchut or Guet. The former employed a solution in the proportions of one of the salt to three of water; the latter, in the treatment of membranous croup, made use of a still more concentrated solution; namely, equal parts of the nitrate of silver and distilled water. Ordinarily, I have applied in croup, a solution composed of from two scruples to a drachm of the salt, dissolved in one ounce of distilled water. A remedy of this strength I have applied freely to the fauces, pharynx, and into the larynx of young children, in a large number of cases during the last eight years, and in no single instance have I observed any indications of the danger of suffocation from its

employment. On the contrary, I have repeatedly observed, and have once before remarked, that much less bronchial irritation is produced by the application of the nitrate of silver into the larynges of young children who are suffering from croup, than when it is introduced into those of adults who are affected by chronic disease of the larynx.

In cauterizing the cavity of the larynx in the above disease in adults, I have advised on a former occasion,<sup>1</sup> that the aperture of the glottis should not be passed until after the parts in the faucial and pharyngeal region had been prepared by having the solution applied for a few times to the pillars of the fauces, the epiglottis, and about the opening of the glottis. Proceeding in this manner, it has been shown that the instrument may then be passed into the larynx without producing half the amount of that irritation which its introduction below the epiglottis would have awakened without these preparatory steps.

Happily, it is not necessary to take these precautionary measures before employing the topical remedy, in the treatment of croup in children ;—for, as we have seen, applications of the argentine solution of a proper strength may be employed without apprehension in these

<sup>1</sup> Treatise on Diseases of the Air-Passages, etc., p. 199.

cases ; and these applications should be made promptly to the tonsillary and pharyngeal regions, whenever the symptoms present indicate the commencement of the exudative inflammation in the mucous membrane of these parts.

The instrument which I have ordinarily employed for making direct medicinal applications to the fauces, and into the cavity of the larynx, in the topical treatment of croup, is one composed of whalebone, about ten inches in length, slightly curved at one end, to which curved extremity is securely attached a small round piece of fine sponge. (*See Plate.*)

Care should be taken that the sponge be not only firmly fixed to the rod of whalebone, but that it be not of a size too large to pass the aperture of the glottis. Anatomists are aware that there is but a very slight difference in size between the larynx of a child of two years, and twelve years of age ; and that, at this period of life, the calibre of the tube is from three-eighths to half an inch in diameter ; consequently, if the sponge be formed so as not to exceed one third, or one half of an inch in diameter, it can be made, with slight pressure, to pass the aperture of the glottis, and to enter the laryngeal cavity.

The instrument being prepared, by suitably saturating the sponge with the solution to be

applied, and the head of the child being firmly held by an assistant, and the base of the tongue depressed with a spoon, or any other suitable instrument, the operator carries the wet sponge quickly over the top of the epiglottis, and on the laryngeal face of this cartilage; then, pressing it suddenly downwards and forwards, passes it through the opening of the glottis, into the laryngeal cavity. If any patches of false membrane are to be observed upon the pillars or tonsils, the sponge should be passed freely over these parts, and also upon the posterior wall of the pharynx.

Not unfrequently, if topical measures are employed in the very onset of the disease, and before the exudative inflammation has extended much into the larynx, the affection may be arrested by one or two applications of the caustic solution to the fauces, and the opening of the glottis, without ever passing the instrument upon the mucous surfaces of the larynx.

In March, 1847, Dr. P., of this city, called at my office, and requested me to visit, with him, a young child, about two years old, who that evening had been attacked with croup. This child had been indisposed for several days, with a cold, and some slight affection of the bowels,

but not until that afternoon and evening had symptoms of croup been present.

We found the patient with a croupal cough, stridulous and laborious respiration ; and, indeed, presenting unequivocal indications of the presence of the disease. The attending physician had administered an emetic, and had adopted other ordinary measures, before calling for me. Discovering evidences of plastic inflammation about the throat, I advised the immediate application of the caustic to these inflamed parts, and, at the request of Dr. P., I applied a solution of the strength of forty-five grains of the salt to the ounce of water, to the tonsils, the posterior wall of the pharynx, and about the aperture of the glottis. Intending to follow this application with a second, and to carry the sponge into the larynx, if necessary, I remained a short time for this purpose ; but, in less than half an hour after the first cauterization, the respiration became less embarrassed, the cough less croupal, and I left without repeating the local remedy. The next day, Dr. P., who remained with his patient all night, called and informed me that the child breathed with considerable freedom, and slept well a part of the night ; that early in the morning, the respiration becoming again more stridulous, he deemed it advisable to make a



second application of the caustic solution. After this was done, the croupal respiration and other symptoms of the disease subsided rapidly, and, by afternoon of that day, had all, or nearly all, disappeared.

Having seen, on several occasions, the local application of the nitrate of silver act promptly and efficiently in arresting exudative inflammation in its formative stage, I have been led to consider it of the highest importance in the treatment of membranous croup, that the first indications of the disease should be observed, in order that, by the early employment of this local remedy, the specific inflammation may be arrested before it shall have extended into the larynx and bronchial divisions.

It is well known to the experienced practitioner that in many cases of membranous croup, the disease will come on in a manner so stealthy that plastic lymph will be found in some instances coating the tonsils and pillars of the fauces, before alarm has been awakened by the patient having manifested any rational symptoms of croup, unless it be those merely of a common cold, or slight hoarseness of the voice. It is seldom, indeed, that much hoarseness attends the ordinary cold of young children. When, therefore, this symptom is observed to be present, in



catarrhal disease, especially if the child exhibiting it, is of a family predisposed to croup, the physician should never omit to examine the throat of such a patient, in order to detect, and, if necessary, to be able to combat the earliest manifestations of exudative inflammation. During the more than ordinary prevalence of croup in this city last winter, a physician of my acquaintance, whilst attending, in consultation, a fatal case of the disease in a family where one or two had already died of this affection, observed that another child, although apparently perfectly well, and engaged at his play, exhibited a slightly raucous condition of the voice ; and, calling the child to him, found, on examination, the throat to be inflamed, and the pillars and tonsils to be coated with several distinct patches of albuminous deposit.

The attention of the attending physician was called to these facts, and the threatened danger from such indications, pointed out. But, as the child had made no complaint, and the parents, on being questioned, had observed no cough, or any other symptoms of indisposition in their child, the doctor believed that no cause of alarm existed, and, in a pleasant way, was disposed to laugh at the apprehensions of his professional brother. They proved, however, to have been

too well founded, for, in less than three days from that time, the child was dead of croup.

If we admit that the peculiar inflammation of croup has its origin, ordinarily, about the tonsils, and the opening of the air-tubes, we can understand how readily the application of the nitrate of silver to the parts about the larynx, may arrest the disease, if the topical remedy is employed in the commencement of the exudative process.

After the inflammation has advanced, and the surfaces of the larynx have become involved in the disease, the argentine solution should not only be applied to the tonsils and to the faucial region generally, but the applications must be extended into the laryngeal cavity.

If the exudations are not already formed into adventitious membrane, the employment of a few successive applications below the epiglottis may be sufficient to arrest the plastic inflammation altogether. But even in a more advanced stage of the disease, when, from its continuance, and the severity of the disease, we have reason to apprehend the formation of a false membrane or a "tubular mould," throughout the larynx and trachea, we should not despair of removing the obstruction or of arresting the inflammation.

Mr. Ryland, who advances the theory that

the inflammation in croup has its origin chiefly in the cellular tissue that enters into the composition of the mucous membrane, and not in the muciparous follicles themselves; and that the albuminous exudation is poured out by the secernent arteries of the cellular structure, admits that "after an uncertain interval, the mucous glands become consecutively affected by the inflammation, and secrete a quantity of their proper fluid, which assists in loosening and detaching the false membrane, and, except in a case of relapse, puts a stop to its further formation."<sup>1</sup>

Now, it is to secure and expedite this very sanative process, that I would recommend the prompt application of the caustic solution to the diseased mucous surfaces within the larynx, in order to effect an expulsion of the false membrane which may have formed in that cavity; for pathologists, who have been accustomed to post-mortem examinations of children who have died during the latter stages of croup, have generally found that the lymph is partially detached from the lining membrane by an intervening layer of mucus; "and it has, therefore," adds the writer just quoted, "been considered an important indication to excite the action of the

<sup>1</sup> *Op. citat.* pp. 114-5.

muciparous follicles, that by largely secreting their peculiar fluid, they may loosen the adventitious membrane and render its expectoration easy.”<sup>1</sup>

When called, therefore, to a case of croup in this its second or developed stage of the disease—and unfortunately, it is not until this period of the affection that medical aid is resorted to in a large proportion of the cases of croup—the local employment of the nitrate of silver, conjoined with other appropriate measures, should be entered upon at once.

An application may first be made to the tonsils, and about the opening of the glottis. After a delay of from fifteen minutes to an hour, the operation may be repeated, and the sponge wet with the solution should then be passed into the glottis. The cauterizations may be repeated once in two, four, or six hours, according to the effect produced, and the intensity of the disease.

When the symptoms indicate that the disease has extended into the tracheal divisions, or when the affection is complicated with inflammation of the bronchi, the applications should be repeated more frequently, in order that some of the solution may find its way over the mucous surface of the larynx and trachea into the bronchial divisions.

<sup>1</sup> *Op. citat.* p. 15 v.

## CHAPTER VI.

## DIPHTHÉRITE, OR THE CROUP OF ADULTS.

THERE exists a form of exudative inflammation which M. Bretonneau calls Diphthérite, or the croup of adults, but which is not exactly identical with the croupal inflammation of children. The same parts, however, are affected in both diseases, and they both end in the effusion of plastic lymph ; but true croup ordinarily commences with catarrhal symptoms, is more sthenic in its nature, and is confined in its attacks to children and persons before the age of puberty, whilst the above form of disease commences with pain, redness, and swelling of the tonsils and back of the throat generally, and attacks, moreover, individuals of all ages, but those especially who have become debilitated by other diseases.

The diphthérite proves frequently fatal. M. Louis, who, under the name of "Croup chez l'adulte," describes the disease, records only one case in which a cure was obtained by medical treatment. "It causes death," Mr. Ryland remarks, "very rapidly, when the morbid action

has reached the air-passages, because the larynx is always affected ;” in Louis’s cases the patients never lived longer than from eighteen to thirty-six hours after the moment when we might presume, from the alteration of the voice, that the false membrane had reached the larynx. Diphthérite occurs frequently as an epidemic, and is considered by M. Bretonneau as decidedly contagious, especially when combined with scarlatina, which is one of its most frequent complications.

Still further to illustrate the nature and cause of this disease, and the effects of topical remedies in its treatment, I shall here introduce the two following cases of diphthérite, which have been recorded by Ryland,<sup>1</sup> together with a third, which came under my own observation, and which was brought to a successful termination by means of the topical application of the nitrate of silver to the diseased parts.

#### CASE XI.

The patient, a strong boy ten years old, began to experience some difficulty of swallowing on the 1st of January. On the 4th, the tonsils were greatly swollen, and, as well as the uvula, were covered with a greyish concretion ; respi-

<sup>1</sup> Op. citat. p. 164-5.



ration frequent, and attended by a guttural sound; tumefaction of the cervical glands near the angle of the jaw. Pulse 94 to 96. Application of concentrated muriatic acid to the fauces, and a grain of calomel to be given every hour.

On the 5th and 6th, the state of the patient continued the same, except the swelling of the glands increased.

7th. Deglutition performed with greater ease; tonsils less swollen, but still covered with false membrane; tumefaction of the cervical glands remarkably diminished. The calomel was discontinued.

8th. Swelling of the glands again augmented; inspiration attended by a hissing noise; croupal cough. At eleven o'clock the dyspnoea increased, and death took place. Twenty minutes after death, tracheotomy was performed, and artificial respiration had recourse to, but with no beneficial effects.

*Dissection.*—The lungs were healthy; the mucous membrane of the bronchi pale; that of the trachea, towards its middle part, partially reddened, and covered with a tubular membranous concretion, which was loose at its lower extremity, but became thicker and more adherent in the larynx, and less so again on the epiglottis.

The whole of the back of the fauces, the upper part of the pharynx, and the posterior orifice of the nostrils, were covered with membranous concretions, having a most intimate adherence to the parts on which they lay.

#### CASE XII.

A woman aged 72, had, when she was first seen, suffered for some days from sore throat, for which leeches had been applied. On the following day her countenance was flushed and anxious, respiration difficult, and accompanied by a hoarse sound, voice scarcely audible, deglutition impossible, pulse developed, and skin hot.

A few hours after, on examining the throat, a whitish false membrane was observed on the anterior part of the velum palati, and on this being raised, the mucous membrane beneath was bloody; the other symptoms were in no respect relieved.

On the following morning the patient was dying, the respiration shorter and more sonorous, and death occurred soon after the visit.

*Dissection.*—A very thick false membrane covered both surfaces of the velum palati, extended into the nasal fossæ, and penetrated into the larynx, trachea, and bronchi; it adhered more strongly to the larynx than to the trachea.

## CASE XIII.

Early in May, 1847, Mrs. B., of Forsyth st., about 32 years of age, was attacked with measles. She was healthy and robust, before contracting the disease, and was seven months pregnant at the time of her attack.

Nothing unusual occurred during the progress of the measles, until towards the close of the eruptive fever, when Mrs. B. was seized with pain and inflammation of the throat, attended with swelling of the tonsils and fauces generally, and with dyspnœa and great difficulty of deglutition. Her attending physician, Dr. Belcher (Sen.), was immediately called, and finding the above symptoms present, employed both general and local bleeding, and such other antiphlogistic measures as were deemed advisable. But the disease continuing to advance, another physician, Dr. M., of this city, was called in consultation, and other measures were adopted, but without arresting in any degree the progress of the disease.

On the 18th of May, one week after the attack of the diphthêritic inflammation, I was requested to see this patient, in consultation with the attending physicians.

The following was the condition in which I

found her at this period:—She was supported in an upright position in her bed, with her head thrown back and breathing with the greatest difficulty; the lips and face were livid, the countenance anxious; the pulse small and frequent, and the extremities cold; there was a hoarse, croupal cough, with great difficulty of swallowing, and an entire suppression of the voice. On inspecting the throat, the fauces, tonsils, and the uvula, and indeed every part that could be brought into view, were found to be completely coated with a dense false membrane. By depressing the tongue, nearly the whole of the epiglottis was exposed, and that cartilage, as well as the pharynx low down, could be seen covered with the same adventitious deposit, leaving no doubt, from the condition of the voice and the circulation, that the exudative inflammation had not only entered the larynx and trachea, but had reached even the bronchial terminations.

At the consultation it was agreed that as all other means had failed, an attempt should be made to relieve the larynx by topical applications of the nitrate of silver to the diseased mucous surface, and I was requested to make these applications.

Employing a solution of the strength of forty-five grains of the salt to the ounce of water,

I applied it freely to the whole faucial region, and also passed the sponge wet with the solution into the larynx. The patient manifested no uneasiness whatever from the application, and, on being questioned, declared she did not feel it in the least degree. The strength of the solution was now increased up to sixty grains to the ounce of water, and a second and third cauterization was made deep into the cavity of the larynx, all in the space of fifteen or twenty minutes.

It was not until the last application that the patient complained of any irritation having been produced by the caustic solution. Many shreds of the false membrane were brought away by the sponge, and were also ejected by the cough and expectoration that followed the last two applications. So decided was the relief obtained by these operations that the patient begged to have them repeated before we left the house.

A supporting plan of treatment was advised for the patient, and it was agreed to return at six o'clock and repeat the applications.

At the above hour in the afternoon, we found the patient exhibiting symptoms more aggravated than those which were present in the morning; the lips and countenance were of a livid aspect,



the respiration was more stridulous, and the breathing was being performed with still greater difficulty. The relief that followed the first applications had continued for several hours, but for some time before our return in the evening, the above symptoms had been coming on with constantly increasing violence.

At this visit, the applications of the sponge wet with a solution of sixty grains to the ounce of water, were made into the larynx at intervals of five minutes, care being taken at each application to convey below the epiglottis as much of the fluid as the sponge could contain. A large quantity of muco-purulent matter, containing many particles of the false membrane, was ejected by coughing after each cauterization.

Soon after these operations, the patient expressed herself greatly relieved, and we left her, with her respiration much less embarrassed than it was on our arrival; and the following night was passed by the patient with less distress, restlessness, and oppressed breathing, than had been present during either of the two preceding nights.

May 19th. There is still great prostration, anxiety, and stridulous respiration present. The countenance is yet livid, the cough is croupal, and the voice is reduced to a feeble whisper.



But it is concluded, notwithstanding, that our patient has lost nothing, on the whole, during the last twenty-four hours. Some patches of albuminous secretion can be seen about the tonsils, the uvula, and the epiglottis; but it has been detached and removed from many parts of the throat, leaving the mucous membrane beneath thickened and inflamed.

A solution of four scruples of the nitrate of silver to the ounce of water was made, and three cauterizations of this strength were employed during the day. The effect of each application was to produce a free expectoration of albuminous matter, which was sure to be followed with great relief for a longer or shorter period.

May 20th. But little change occurred in our patient throughout yesterday and last night. Four cauterizations were employed during the day and night, which caused the ejection of much adhesive mucus, with membranous fragments. Some rest was obtained, but great restlessness, feeble pulse, cold extremities, and oppressed respiration, were present during the greater part of the night.

On examining the patient's throat to-day, it was found that the coriaceous deposit was almost entirely removed from the tonsils, uvula,

and epiglottis, yet the embarrassed and sibilous respiration, the great anxiety, and the livid countenance of the patient, plainly indicated that the false membranes were still obstructing the air-passages below, and were thus preventing the perfect arterialization of the blood; it was therefore determined to carry the cauterizations deeper into the trachea than had yet been done.

In the presence of Dr. Belcher, the attending physician, and my friend Dr. S. Conant Foster, who had accompanied me to see the case, I passed a sponge, saturated with a strong solution of the nitrate of silver—eighty grains to the ounce—through the rima-glottidis, and along the whole length of the trachea. The withdrawal of the probang was followed by a severe fit of coughing, and the expectoration of a great quantity of muco-purulent and membranaceous matters.

Soon after this last operation, the patient appeared greatly relieved, and breathed with more freedom than she had done at any time since her first attack. The same application was repeated at evening, and from this time her recovery was rapid. The cauterizations were continued every day for nearly a week longer,

when the consultations were discontinued, as the patient was considered out of danger.

Mrs. B—— recovered perfectly, and was delivered of a healthy child at her full time; but vocalization did not return until many weeks after her restoration to health. It has since been fully restored.

I am fully sensible that, in the treatment of croup, the removal of the false membrane simply is not, after all, the only indication of importance; for, it has been shown repeatedly, from the dissections of those who have died of the disease, that death has not occurred as the result altogether of the obstruction presented by the adventitious membrane, inasmuch as it has been found in many such cases, that within the membrane a space was left for a current of air, sufficient to support life. But, the same exudative process which results in the spreading of a false membrane over the mucous surface of the larynx and trachea, will, if allowed to progress, inflame the whole bronchial divisions, and block up and distend the ramifications of the bronchi and the lungs with serum and puriform matter; and in this way will effectually prevent the arterialization of the blood. To arrest, therefore, this

morbid condition of the mucous membrane, which causes the generation of these albuminous exudations, is an indication of the highest importance. Now, from the well-known therapeutic effects of the nitrate of silver upon inflamed mucous tissues, and from my own experience in its use, which is not a limited one, I can with confidence recommend it as the most efficient and certain of all topical agents for effecting this very purpose. So salutary, indeed, have I been led, in my experience, to consider the effects of the nitrate of silver when topically applied to the mucous membrane, and its cryptæ, in plastic inflammation, that for several years I have not hesitated to employ it, in combination with appropriate general remedies in all stages of both simple and complicated membranous croup.

## CHAPTER VII.

## TREATMENT OF CROUP CONTINUED.

*General Remedies.*—Notwithstanding the important consideration which has been given to topical medication in these pages, I would not have its use preclude the employment of appropriate general remedies in the treatment of membranous croup. I shall only remark, however, in this connexion, upon some of the most important of the many remedies which have been advised by different authors in the treatment of this disease.

*Emetics.*—To fulfil the first intention of cure, in the treatment of croup, which is to arrest inflammatory action, and to prevent the formation and accumulation of albuminous matter in the air-passages, emetics, more than all other general remedies, have been recommended and employed by different writers and practitioners.

“ When given during the first stage of croup, they disembarass the air-passages of the glutinous secretions that clog them, and often produce such a shock to the system as to termi-

nate the disease at once. This shock, and the perspiration that follows it, are among the most important effects of the remedy; for even when no mucous or albuminous matters are expelled from the lungs during the action of the emetic, the patient is generally much relieved after having vomited.”<sup>1</sup>

From among the various substances employed to produce emesis in croup, the antimonial preparations are the most frequently selected. They appear to be very generally recommended by writers on this disease, both in England and in France; and American practitioners employ this class of remedies to a great extent, in the treatment of Croup. “The tartarized antimony,” says the author above quoted, “is the best medicine of this kind, and it should be given at short intervals, till vomiting is effected; after which it should not be discontinued, otherwise the reaction might prove injurious, but nauseating doses must still be administered.”

Now, with regard to the use of this remedy when employed to a certain extent, and with that caution which should always be observed when administering so powerful an agent, emetic-tartar is an invaluable remedy in the

<sup>1</sup> Ryland, p. 153.



treatment of exudative inflammation. But, notwithstanding all this, and the high authority for its use, I have no hesitation in declaring my firm conviction, and this, too, after many years of observation, that the injudicious use of tartarized antimony in the treatment of diseases in young children, has destroyed more lives than it has been instrumental in saving among this class of patients !

With the young subject it not only acts as a direct and powerful sedative, but as a local irritant upon the mucous surfaces. In the observations recorded by Lepelletier on the effects of frequently repeated doses of tartar-emetic upon the human system, it is stated that the pulse was reduced from 120 to 34 beats per minute, and in one from 72 to 44 beats per minute, under the use of continued doses of tartarized antimony.<sup>1</sup>

In a recent number of the New York Journal of Medicine,<sup>2</sup> Prof. John B. Beck, of this city, has published a highly interesting and instructive paper, "On the effects of Emetics in the young subject." In this article he has collected the testimony of many eminent medical men, to show the uncertain, energetic, and dangerous

<sup>1</sup> Medicines, their Uses and Mode of Administration, by J. Moore Nelligan, M. D., etc. p. 157.

<sup>2</sup> Vol. vii. No. 20.

effects of tartarized antimony, when administered in continued doses to young persons.

In one instance recorded by him, "the one thirtieth part of a grain of tartar-emetic given to a child a year old, laboring under croup, produced such severe and protracted vomiting, together with general prostration, as to require stimulants to save life." In another, "small doses of tartar-emetic," were administered to a child about three years old, in a case where no danger was apprehended from the disease. Alarming symptoms of prostration came on, and notwithstanding the use of stimulants, the child died in an hour or two after Dr. Beck saw it.

From these facts, therefore, and others which have fallen under his own observation, and from the recorded opinions of many eminent medical men, Dr. Beck has come to the conclusion, that as a general rule, emetic tartar ought never to be used in children under one year of age; and that in all cases, "the preparations of antimony ought to be resorted to with great caution in very young children, and should never be used except in those cases where a sedative effect is required, and can be borne with safety."<sup>1</sup>

As inflammatory excitement is, ordinarily,

<sup>1</sup> Loc. cit. pp. 158-9.

present in the commencement of croup, and the indication being to arrest this action, an emetic of tartarized antimony, either alone or in combination with ipecacuanha, may, generally, be administered with safety, at this stage of the disease. But, great caution should be observed in continuing the medicine, after the manner which has been recommended by many medical writers. Should a repetition of emetics be required, or medicines to be continued in nauseating doses, other remedies, equally efficacious, after the stage of excitement has passed, and altogether safer, may be employed.

If called during the first stage of croup, I am accustomed to commence the treatment of the disease, by exhibiting an emetic dose of tartarized antimony and ipecacuanha, from half of one grain, to a grain of the former, with ten to fifteen grains of the latter, according to the age of the child, and, after a delay of ten or fifteen minutes, to follow its administration with the topical application of a solution of nitrate of silver to the tonsillary and faucial regions.

This operation has the effect to excite, almost invariably, immediate and free vomiting; and if the emesis and application be repeated in the course of half an hour or an hour, they not un-

frequently arrest the further progress of the exudative inflammation.

When it becomes necessary to repeat the emetic operation, in the course of the progress of the disease, I have found the sulphate of zinc, in combination with ipecacuanha, to be the most certain, efficacious, and safe emetic that can be administered.<sup>1</sup>

Dr. Copland recommends, as the best emetic, on the increase of the disease, tartarized antimony, and the oxymel of colchicum.

“Whilst vascular excitement continues,” he remarks, “either this combination, or the antimony only, in repeated doses, as suggested by Cheyne and Michaelis, is the best emetic; but when we wish to detach the membranaceous exudation, the preparations of squills alone, or with ipecacuanha, are preferable.”<sup>2</sup>

*Blood Letting* :—“If the patient is in the first, or inflammatory stage of croup,” says Dr. Cheyne, “no experienced physician will omit bleeding; if in the second, or that of suppura-

|                                          |       |
|------------------------------------------|-------|
| <sup>1</sup> ℞ Zinci Sulphatis . . . . . | gr. x |
| Ipecacuanhæ pulv. . . . .                | ℥j.   |
| Aquæ tepidæ. . . . .                     | ℥iv.  |

Misce.—A dessert spoonful may be administered every five minutes, until vomiting occurs.

<sup>2</sup> Dictionary of Prac. Med., Article Croup.

tion, no physician will propose it.”<sup>1</sup> M. Bretonneau, a physician of equal eminence and experience, makes the following observations on this subject :—“ I am forced to declare, contrary to the received opinion, that bleeding in croup has done harm, and accelerated rather than retarded the spread of the coriaceous inflammation. I did not abandon this measure till after reiterated proofs of its injurious effects.”

It is difficult to reconcile these adverse opinions with reference to bleeding—opinions which are not only entertained by the above authors, but likewise by many other distinguished writers and practitioners. Much the larger portion of these, however, advocate bleeding, either general or local, in croup, if resorted to in the first stage of the disease, and in cases of an unequivocally inflammatory type. “In the more inflammatory states,” says Dr. Copland,<sup>2</sup> “it should be promptly and fully performed ;” but he adds, “little will be gained by resorting to it before inflammatory action is manifested, or after excitement has subsided.”

Mr. Ryland, who is an advocate for blood-letting when the febrile excitement is great, the patient strong and plethoric, and the disease in

<sup>1</sup> Cyclop. of Prac. Med., Article Croup.

<sup>2</sup> Loc. citat.

an incipient state, remarks; "in town practice, and especially amongst the pauper class of the community, bleeding, even by leeches, generally does harm, unless in the very earliest stages of the disease; it weakens the patient, and in most instances without putting a stop to the tracheal inflammation."

Dr. Home likewise declares that bleeding employed in the second stage of this disease, or when the membrane is formed, cannot possibly be of advantage.<sup>2</sup>

In my own experience, I have not been favorably impressed with the effects of blood-letting in croup; having met with cases where this measure being employed freely, not only failed to arrest the disease, but evidently proved positively detrimental.

I would not, however, be understood to discard altogether bleeding in croup. Cases there are, where a timely and judicious employment of this remedy will produce the happiest results. When the affection occurs in strong and plethoric children, and is attended with a high degree of vascular excitement, depletion in the access of the disease by either local or general bleeding, is a most efficient means of arresting

<sup>1</sup> Loc. citat. p. 149.

<sup>2</sup> An Inquiry into the Nature of Croup, p. 57.



the exudative inflammation. But if this favorable period, which Dr. Cheyne calls "the golden opportunity," be lost, and the first stage is allowed to pass, blood-letting will only have the effect in the second stage to weaken the patient, and to check that muculent secretion which serves to loosen and detach the adventitious membrane, and render its expectoration more certain. Blood-letting, then, if employed at all, in the treatment of croup, let it be remembered by every practitioner, must be adopted before the adventitious membrane has formed, for its use after this process has taken place, will, as M. Bretonneau has remarked, accelerate rather than retard the coriaceous inflammation.

*Mercury.*—Dr. Rush, of Philadelphia, was amongst the first to recommend the employment of the mercurial preparations in the treatment of croup. "Our principal dependence," Dr. Rush remarks, "must be placed on calomel; the bark is scarcely a more certain remedy for intermittents, than calomel in the humid cyananche trachealis." <sup>1</sup>

Many other physicians place great dependence on this remedy, exhibited every few hours in croup. Some writers consider it a specific

<sup>1</sup> Medical Inquiries and Observations.—Vol. i. p. 145.

in the disease, if administered in large and frequently repeated doses. Calomel has been given alone, and in combination with the antimonial preparations, with antispasmodics, with James's powder, with the oxide of zinc, and with opium. Of all the mercurial preparations calomel is undoubtedly the best form for internal administration in the treatment of croup. In my own experience, I have had undoubted evidence of its great utility in this disease. In all cases of exudative inflammation, where topical measures and emetics fail in the first stage to arrest the disease, prompt recourse should be had to mercurial remedies. Under such circumstances, I am accustomed to administer calomel in combination with opium and ipecacuanha.<sup>1</sup> The dose should be varied according to the age and condition of the patient. From one to three grains of calomel, with half a grain of ipecacuanha, and from the tenth to the twentieth of a grain of opium, may be given every two or three hours until the disease yields, or the constitution is affected by the remedy. "Directly that the patient becomes influenced by the calomel, lymph ceases to be effused in the trachea; and

|                               |           |        |
|-------------------------------|-----------|--------|
| ℞. Hydrargyri Submur.         | . . . . . | ℥j.    |
| Ipecacuanhæ pulv.             | . . . . . | gr. x. |
| Opii pulv.                    | . . . . . | gr. i. |
| Misce bene et divide in pulv. | x.        |        |

though it is doubtful whether the false membrane is ever absorbed again into the system, it soon becomes detached by the secretion from the subjacent mucous follicles, and will be coughed up by degrees.”<sup>1</sup>

*Hydrocyanic Acid.*—The sedative powers of hydrocyanic acid when medicinally employed, its influence in reducing the force and frequency of the pulse, and in allaying the sensibility of the mucous system, serve to render it a valuable remedy in the treatment of some of the forms of croup.

Hydrocyanic acid was first employed as a therapeutic agent by the Italian physicians, near the commencement of the present century. Soon after its introduction into the *Materia Medica*, it obtained some celebrity as a remedy in disease of the pulmonary organs, and it has since been employed with more or less repute in other morbid conditions of the air-passages. It is the most valuable remedy we possess, for the treatment of whooping-cough. “Cautiously administered,” remarks Dr. Granville, “this medicine has seldom failed to remove the disease, and it is singular that children bear the

<sup>1</sup> Ryland, p. 148.

action of this sedative medicine in small doses, better than adults.”<sup>1</sup>

In the treatment of the latter stage of croup, particularly when this disease has been complicated with bronchial inflammation, I have found the hydrocyanic acid invaluable in allaying the great restlessness—the spasmodic and harassing cough, symptoms which often attend this complicated form of the affection.

Various other remedies have been advised, and are employed for the treatment of croup; but, for an account of these, I shall refer the reader to the more general treatises on the disease.

*Tracheotomy.*—On the subject of tracheotomy in croup, I have but little to remark. Several times I have been called on to perform the operation in the latter stage of the disease, but have always refused to do it. So difficult and dangerous have I considered the operation, and so very small the chances of success attending it, that in no case which has fallen under my notice have I deemed the performance of tracheotomy at all justifiable.

Dr. Cheyne, in his work on the Pathology of the Larynx and Bronchia, has established the

<sup>1</sup> Historical and Practical Treatise on the internal use of the Hydrocyanic Acid.

fact, that death in croup does not occur because there is an insufficiency of air admitted into the lungs to effect the arterialization of the blood; for it has been ascertained that in such cases three eighths of the aerial canal are always open,—constituting a space quite sufficient for the transmission of all the air necessary to the maintenance of the process of respiration.

How, then, can we expect the fatal result in croup to be prevented by the artificial admission of any quantity of air into the pulmonary cells?

“With regard to the general results of tracheotomy,” observes Mr. Ryland, “when performed for the cure of croup, I have no hesitation in saying, that they are so unfavorable as to warrant us in the strongest condemnation of it, under almost every conceivable circumstance.”<sup>1</sup>

After employing the means now at our command, both topical and general, for the treatment of the disease, there does not remain, I believe, a chance of success from the operation: and we are not justified in having recourse to it until these measures have been exhausted.

<sup>1</sup> Op. citat. p. 159.





To the Editor of the  
Edinburgh Medical &  
Surgical Journal,

with the respects  
of The Author

---

New York Dec<sup>r</sup> 14, 1848.



# ESSAYS

ON

## INFANT THERAPEUTICS:

TO WHICH ARE ADDED

OBSERVATIONS ON ERGOT,

AND AN

ACCOUNT OF THE ORIGIN OF THE USE OF MERCURY IN  
INFLAMMATORY COMPLAINTS.

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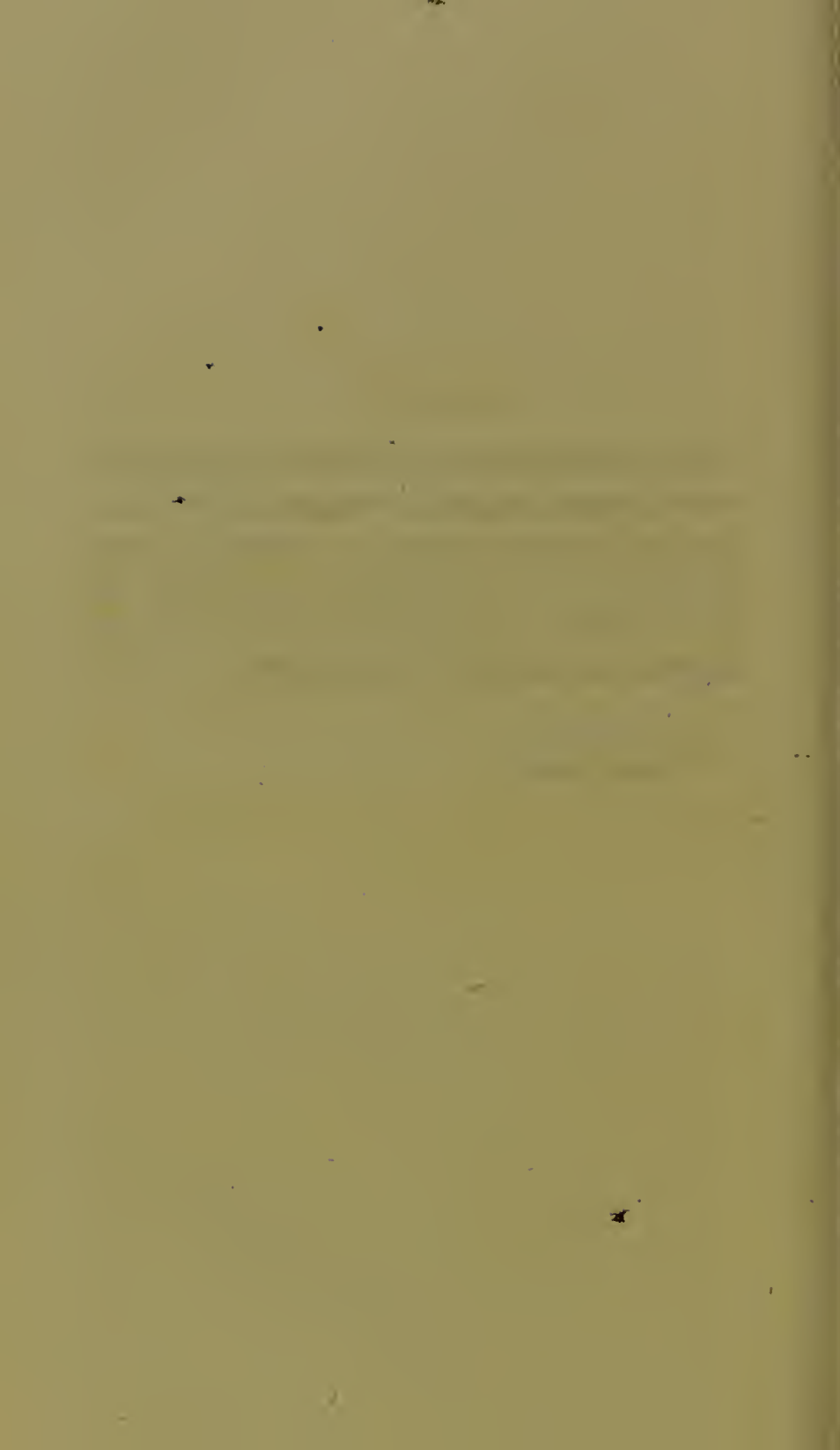
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TO THE GENTLEMEN,  
WHO DURING THE LAST TWENTY-TWO YEARS HAVE  
ATTENDED THE LECTURES ON  
MATERIA MEDICA,  
IN THE COLLEGE OF PHYSICIANS AND SURGEONS OF  
NEW YORK,  
THE FOLLOWING ESSAYS ARE AFFECTIONATELY  
DEDICATED BY  
THE AUTHOR.





## CONTENTS.

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|                                                                                           |     |
|-------------------------------------------------------------------------------------------|-----|
| I. On the effects of Opium on the Young Subject, -                                        | 9   |
| II. On the effects of Emetics on the Young Subject, -                                     | 24  |
| III. On the effects of Mercury on the Young Subject, -                                    | 39  |
| IV. On the effects of Blisters on the Young Subject, -                                    | 54  |
| V. On the effects of Bloodletting on the Young Subject, -                                 | 70  |
| VI. Observations on Ergot, - - - - -                                                      | 88  |
| VII. An account of the Origin of the use of Mercury in Inflammatory Complaints, - - - - - | 110 |



# ESSAY I.

---

## ON THE EFFECTS OF OPIUM ON THE YOUNG SUBJECT.

As a remedial agent, opium has always and justly been looked upon as one of the most valuable in our possession. It has been styled the "donum Dei," the gift of God to man, and Sydenham says of it, that it is "so necessary an instrument in the hands of a skilful physician, that the art of physic would be defective and imperfect without it; and whoever is thoroughly acquainted with its virtues and the manner of using it, will perform greater things than might reasonably be expected from the use of any single medicine."\* High as this panegyric is, it is unquestionably just. Admirable, however, as this agent is, if properly used, it is equally true, that, in unskilful hands, there is scarcely an article, in the whole range of the *materia medica*, capable of producing a greater amount of mischief. That this must be the case, is evident, if we reflect for a moment upon the nature of the

\* The works of Thomas Sydenham, M. D., with Notes by Benjamin Rush, M. D., p. 115.

effects which it is capable of producing, and, at the same time, recollect that these effects are not uniformly the same, but are modified by various circumstances. Thus, at one time, we find it operating exclusively as a stimulant, while at another it displays nothing but its sedative power. Given under certain conditions of the system, it quiets irritation, calms the pulse, softens the skin, and promotes balmy sleep. Under other conditions of the system, it quickens the pulse, suppresses the secretions, increases animal heat and disturbs the brain. In the one case, the state of the patient is materially improved; while, in the other, it is rendered worse. It depends, then, entirely upon the circumstances under which it is given, whether it will prove salutary or injurious, and it is this which renders the proper use of it a matter which requires so much tact and experience.

Now, the circumstances which modify the action of this agent are numerous. Age, sex, temperament, climate, nature of the disease, stage of the disease, in short, every thing which can affect the condition of the system, modifies, in a greater or less degree, its effects. To understand, therefore, completely the manner in which it operates on the system in its different phases, it is necessary to analyze all these modifying circumstances. On the present occasion, I propose to make a few remarks upon only one of them, viz., *age*, with the view of showing more particularly the peculiarities of its operation on the young subject.

With regard to the effects of opium on young

subjects, there are two facts which seem to be well established. The *first* is, that it acts with much *greater energy* on the infant than it does on the adult; the *second* is, that it is more *uncertain* in its action on the infant than the adult. It is in consequence of these peculiarities attending its operation on the infant, that even the smallest quantities have not unfrequently produced the most unexpected and even fatal results. Of this, almost every physician must have seen some melancholy instances. Dr. John Clarke states, that "half a drachm of genuine syrup of white poppy, and, in some instances, a few drops of Dalby's Carminative, have proved fatal, in the course of a few hours, to very young infants."\* In one case, he says, forty drops of Dalby's Carminative destroyed an infant. Mr. Marley says, "I have known three or four instances where the most dangerous symptoms were produced by Godfrey's Cordial and Dalby's Carminative; two nostrums which have no doubt added considerably to the mortality of infants." In a case that fell under his observation, the most rapid and alarming symptoms followed the exhibition of an ordinary dose of syrup of poppies. In another case, he knew half a small tea-spoonful of the syrup of poppies prove nearly fatal to a child eight or ten days old. Thirty-five drops of Dalby's Carminative, he has known to prove fatal to a young child, while, in other cases, larger doses have been given without any unpleasant effects. The same writer

\* Commentaries on the Diseases of Children, p. 33.

relates the case of an infant, nearly poisoned, by considerably less than half an ordinary-sized teaspoonful of paregoric.\* Dr. Bard says, he once knew an infant of several months old killed by ten drops of laudanum, and another brought into very great danger by less than two drops.† Dr. Montgomery states, that he has known more than one instance in which a teaspoonful of the syrup of poppies has proved fatal to a healthy child.‡ Professor Hamilton relates two cases, in which four drops of laudanum proved fatal to children some months old.§ Dr. Merriman reports two cases, in which a dose of Godfrey's Cordial proved fatal.|| He also states, that he once saw a child in the month thrown into a state of excessive stupor, by taking one dose only of a mixture in which there were four drops of laudanum; the actual quantity swallowed could scarcely have amounted to one drop.¶ Dr. Cristison states, that “the administration of three drops of laudanum in a chalk mixture for diarrhœa, to a stout child, fourteen months old, was followed by coma, convulsions and death in six hours.” In another infant, a few weeks old, death resulted from taking four drops of laudanum.\*\*

\* On the Diseases of Children, pp. 29, 30, 31.

† Bard's Midwifery, p. 328.

‡ Pereira's Mat. Med., vol. ii., p. 711.

§ A Treatise on the Management of Female Complaints and of Children in Early Infancy, p. 341.

|| Treatise on the Diseases of Children. By M. Underwood, with Notes by Merriman, Hall, and Bell, p. 106.

¶ Ibid p. 143.

\*\* Treatise on Poisons. Second Edition, p. 625.



Dr. Ryan states, that he has known one drop of the "sedative liquor of opium" narcotize an infant.\* Of laudanum, two drops have been known to kill an infant, nay, in one case, a single drop destroyed a new-born infant.† I have myself seen a young child narcotized by about twenty drops of paregoric. The foregoing facts are sufficient to show that opium acts with peculiar energy and uncertainty upon the infant subject. The causes of this would seem to be the following :

In the *first place*, the great difference in the physical organization of the *infant* and the *adult*. In the young subject the brain and nervous system are much more impressible, and the slightest causes, as we know, will sometimes derange them. Besides, in the infant, the circulation is more rapid—there is a greater proportionate quantity of blood circulating in the brain, and hence a much greater tendency to cerebral determinations. From these peculiarities in the organization of the infant, it happens that convulsions are so much more common in the early periods of life. Thus, for example, the irritation of teething—of worms or crude matters in the intestines, is frequently followed by convulsions. Intermittent fever, which in the adult commences with a chill, in the child is frequently ushered in by a convulsion. Scarlet fever, too, in the child, not unfrequently commences with a convulsion, while in the adult I have never witnessed

\* Midwifery, p. 477.

† London Medical Gazette for 1839, p. 294.

such an occurrence. Now, with such peculiar predispositions characterizing the system in infancy, it may readily be conceived how it is that such an article as opium should act with more power at that period than in after life.

In the *second place*, the difference in the *temperament* or *constitution* of infants. In the adult, we know as a matter of fact, that opium differs greatly in its effects in different constitutions. Thus, as a general rule, the sanguine temperament does not appear to bear the use of this drug as well as the melancholic or the nervous. In the former, it is much more apt to produce cerebral disturbance, and in large doses is more likely to prove injurious. Now, infants differ from one another, as much, if not more, than adults, in these peculiarities of constitution, and, as a matter of course, the difference in the effects of this article must be greater. Besides, as these peculiarities and differences can only be detected by actual experience, and as we cannot of necessity have the same benefit of experience in the case of infants, it is obvious that the difficulty of justly appreciating the action of this drug on the infant must be greatly increased. A greater or less degree of uncertainty, therefore, must necessarily from this cause attend its use in the early periods of life.

In the *third place*, the actual state of the system as to disease. There is no circumstance which modifies the effect of opium in so great a degree as this. In the adult, we see this continually. In some conditions of the system, even small doses

produce the most unpleasant effects, while in other conditions, immense quantities may be given with little or no effect; thus, for example, when severe pain or spasm is present, quantities of this article can be borne, which under other circumstances would prove exceedingly injurious. As illustrative of this, I quote an interesting case related by Dr. Percival. He states that a young man was admitted into the Manchester Hospital, on account of a violent spasmodic disease which recurred periodically in the evening, and after trials of various remedies, doses of opium sufficiently large to mitigate the violence of the paroxysm were ordered, and he took twenty-two grains every night during a week, without producing any soporific effect. On the eighth night he had no return of the spasm. He nevertheless took the opium and in the morning was found dead.\* In this case, a great and sudden change had unquestionably taken place in the nervous system of the patient, and to this must be ascribed the difference of effect. If in the adult, the state of the system makes such a wide difference in the effects of this article, how much more so must all this be the case in the sensitive infant; and it is by not duly regarding this, that such unexpected results sometimes follow from the use of opium. Thus, for example, a child laboring under the acute pain of colic will tolerate doses, which, in the ordinary condition of the system, might prove destructive.

\* Percival's works, vol. i., p. 422.

There is one condition of the young subject particularly in which this remedy is frequently resorted to, in which this is strikingly illustrated. I mean that state of exhaustion which arises from diarrhœa and other bowel complaints. In this state the head is very apt to become affected, and if opium be given with a view of checking the intestinal discharges, not unfrequently insensibility gradually creeps over the little sufferer, and in a short time death is the result; and this, too, even when the quantity used has been apparently adapted with great nicety to the wants of the case. Every observing practitioner must have witnessed such instances. Now in many cases of this kind, there can be no question that the child sinks under the sedative influence of the opium; and the reason is that, in the exhausted state brought on by the disease, the system succumbs much more readily to the narcotic effects of this article, than it does in other conditions of the system.

The foregoing considerations appear to me sufficient to account for the greater power, as well as uncertainty in the action of opium on the infant, than on the adult.

If it be a fact, then, that opium acts in this way upon the infant, it appears to me to involve inferences of great practical moment, which cannot be too deeply impressed on the mind of the young practitioner.

1. That its use should *be avoided as much as possible* in the young subject. I will not say that it ought to be interdicted altogether, because if given

with discretion, it is a remedy of great value in many of the diseases of infants, but it should never be used unless there exists a strong and manifest necessity for it.

2. Great caution should be exercised in the *form* in which it is administered. No preparation should ever be used, which is *not of a known and determined strength*. In England, the *Syrup of Poppies* is the preparation most used for children. In this country it is also used, but not to the same extent. This is a pleasant and mild opiate, and is well adapted to children. It is liable, however, to great objections. Besides being apt to ferment and spoil, it is very *variable in its strength*.<sup>\*</sup> On this account it is really a very dangerous article ; and many cases are recorded (some of which I have already related) in which fatal results have followed the use of it, even in moderate doses. Another objection is, that it is liable to sophistication. Thus a mixture of *laudanum and simple syrup*, has sometimes been sold for it. In the London Medical Gazette, (May, 1831, p. 253), a case is related, where a child died in consequence of a small dose of this latter compound having been given by the mother, who had previously given the same quantity of the pure Syrup of Poppies, with advantage.

\* When properly prepared, *one ounce* of the Syrup of Poppies is generally estimated to contain about one grain of opium ; a drachm therefore, contains one-eighth of a grain. From the variable proportions, however, of active principle contained in the capsules of opium, it is impossible to calculate with any degree of precision, the strength of the syrup prepared from them.



The best preparations for children are *laudanum*,\* and *elixir paregoric*. These are of known strength, and susceptible of division into the minutest doses. *Dover's powder* is another preparation, which may be given to children. It may readily be divided into the smallest doses, and it seems to act much more mildly than equivalent doses of simple opium. It need hardly be stated, that all such articles as Godfrey's cordial, Dalby's carminative, &c., should be totally discarded from regular practice. Besides being uncertain in their strength, and on that account exceedingly objectionable, the sanction thus given to them encourages their use by persons out of the profession, who cannot be supposed to be acquainted, with the dangerous effects of opium on the infant system.

3. In very young subjects, we should never begin the use of this article, except in *very small doses*. Although most practical writers lay down cautions about the use of opium in these cases, yet it does not appear to me that these cautions are sufficiently precise. Most of the writers to whom I allude, specify doses as suitable to certain ages, without stating, that even these doses, may, in certain conditions of the system, prove just as injurious as

\* Even this preparation should not be given without circumspection. "When long kept, with occasional exposure to the air, laudanum becomes thick in consequence of the evaporation of a portion of the alcohol, and the deposition of opium. If given in this state, it often acts with unexpected energy, and cases of death have resulted in infants from its use in doses, which would have been entirely safe if the tincture had been clear."—*Wood & Baché's Dispensatory*, p. 1032, 2d ed.



much larger doses. To illustrate, I will quote the directions given by one of our standard authorities. Dr. Dewees says, "the proper dose of laudanum for infants and children, may be reckoned at the following rates. Half a drop for a child under ten days old; a drop, for one from that period to the end of the month; a drop and a half, or two drops for one from that period to three months; three drops from this to nine months, &c., &c." "When laudanum is to be used as an injection, we may safely increase the quantity three or four fold." He adds, "These doses are prescribed for children who are altogether unused to the use of this drug; the power of bearing more, may be rapidly increased by habit."\* Now, it appears to me that a more dangerous set of directions could not well have been given. Although many children may bear the quantities here specified without injury, yet every now and then a case will occur, in which the most serious results will follow; and it is against these that the necessary precautions should always be taken. In the case of a new-born infant, we are entirely ignorant of the manner in which such an article as this will affect it, and it therefore will not do to begin with *average* doses. To practice safely, we must feel our way with doses much smaller; and then we shall have some guide, and the only guide which the nature of the case admits of, to make the necessary increase in the quantity to be given. Under no circumstances, as a first dose, ought half a drop to be given to a child un-

\* On the Diseases of Children, p. 363.

der ten days—or a drop to a child during the first month. One-eighth of a drop is sufficient to begin with. The quantity, too, directed for an injection is too large. Instead of three or four times the quantity given by the mouth, as far as my experience goes, double the quantity is quite sufficient.

4. The doses of opium should not be repeated *at too short intervals*. This, too, is a point which is not sufficiently guarded by some practical writers. One writer, for example, after specifying the quantity suitable for a child of two and three months, adds, that “this is not to be repeated in less than an hour.” If this means any thing, it means, of course, that after the lapse of an hour, the dose may be repeated with safety. This, however, will not be sustained by experience. Even if a first dose does not narcotize, it frequently produces a degree of listlessness and indifference to food on the part of the child, which, if it be kept up by repetitions of the opiate, may eventually prove just as destructive. This is strikingly illustrated in those states of exhaustion from diarrhœa, where the due supply of nourishment is so essential to recovery. Where repeated opiates are necessary, the intervals between the doses should be long enough to enable the child to recover somewhat from the sedative influence.

Before concluding these observations, I cannot refrain from making a remark or two in relation to the use of this article by persons out of the profession. The mischief that is done in this way is incalculable. If, in the hands of those acquainted

with its virtues, opium is an article so dangerous and uncertain in its action, what must it be in the hands of the ignorant ; and yet we see it given to infants, day after day, and night after night, by nurses and mothers, not merely without the consent of the physician, but sometimes contrary to his express injunctions.

There are two ways in which it is used by persons out of the profession, in both of which it proves injurious to the child. The first, is by giving it in occasional doses ; the second, by giving it constantly. The first is bad enough, but the second is still worse. The first, now and then, unexpectedly destroys a child ; the second is followed by a train of the most disgusting consequences, worse, if possible, than those of habitual drunkenness in the adult. Fortunately, these latter cases are not of such frequent occurrence ; occasionally, however, they are met with where the parent, for the purpose of quieting it, has been induced to keep a child for months under the daily influence of paregoric, Godfrey's Cordial, or some other opiate nostrum. In these cases, the effect is to stunt the growth of the child ; it is emaciated and puny ; the skin is flabby and shrivelled ; the lips are bloated and the countenance sallow and wrinkled. There is an absence of all intelligence, and the whole appearance is haggard and aged, presenting a sort of "miniature of old age." Not long since I witnessed a case of this kind, in which a child of fourteen months old did not appear larger than one of two or three months. With the exception of one month,

it had been kept upon paregoric almost every day since its birth. The mother was a poor woman, and on inquiring of her the reason, she stated that she had resorted to this method of keeping the child quiet while she attended to her work.

Of the extent of the mischief annually perpetrated by the unprofessional use of opium, some idea may be formed from a report made to the House of Commons, containing returns from the coroners of England and Wales, of the inquisitions held by them during the years 1837 and 1838, in cases of death by poison. The total number of deaths by poison in these years was 543, of which 52 were very young children, most of them at the breast, in consequence of opium, or some of its preparations having been given by mothers and nurses, in ignorance of its effects. In addition to this, 20 more were destroyed by opium or laudanum administered in mistake for other medicines.\*

These facts are certainly appalling; and if any subject connected with medical police is worthy the attention of the public authorities, it is certainly this. How the evil is to be corrected, it is not easy to say. Much, however, might be done by the proper dissemination of information on the subject. In most cases where opium is administered to children by persons out of the profession, it is disguised in the shape of some nostrum, so that they are not aware of what they are giving, and even when they are aware of it, they are not acquainted with the

\* See Dunglison's *Intelligencer*, vol. iii., p. 299.

dangerous effects of it on the infant system. If parents and nurses were made better acquainted with the fact that such articles as Godfrey's Cordial, Dalby's Carminative, and most of our medicated lozenges and candies, owe all their composing properties to the opium which they contain, and that opium even in small doses is frequently a deadly poison to the infant, one would suppose that it could not but exert a salutary influence in correcting, to a certain extent, at least, the evil of which we are speaking, and the dissemination of this kind of knowledge, by the proper authorities, would confer a lasting benefit upon the community.



## ESSAY II.

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### ON THE EFFECTS OF EMETICS ON THE YOUNG SUBJECT.

With the exception of cathartics, there is no class of remedies more generally resorted to in the management of the diseases of children, than emetics; and in a large number of cases, there is certainly none more useful. They are active agents, however, and like all agents of this description are capable of doing good or evil, according to the manner in which they are given. In the use of them, therefore, it is all important to ascertain whether there is any thing in the young subject which modifies their operation. Unless this is done, it is impossible, of course, to prescribe them with any degree of precision, or even safety. The subject is one of interest as well as of practical importance, although it does not appear to have attracted the attention to which it is so justly entitled. In a previous paper, I endeavored to point out how the effects of opium were modified in the infant subject. On the present occasion, I propose to pursue a similar investigation in relation to Emetics.



As it regards *the mere mechanical act of vomiting, young children perform it more easily than adults.* This is a fact which has long been observed by practical men, and about which there can be no question. It is no doubt a wise provision of the Creator to enable the child to relieve itself from the effects of an overloaded stomach, to which it is so constantly liable in the early period of its existence. Although the fact has thus been long known, and the intention of it is obvious, yet the reasons have not been so well understood. They appear to be the two following.

In the first place, from the experiments of Majendie, in relation to the manner in which vomiting is performed, it would seem that in that process, the stomach is in a great measure passive, and that a certain degree of pressure upon it from the surrounding organs is absolutely necessary, before vomiting can be accomplished. This pressure is made by the contraction of the diaphragm from above, and of the abdominal muscles from below, upon the viscera surrounding the stomach. As a matter of course, the pressure thus exerted will be greater or less according to the volume of the viscera. Now, it is well known that in the early periods of life, the abdominal viscera have a much larger proportional size than they have in the adult. This is particularly the case with the liver.\* In

\* According to Meckel the proportion between the weight of the liver and that of the whole body, is as 1 : 18 or as 1 : 20, in the full grown fœtus; while in the adult it is as 1 : 35 or as 1 : 36. Meckel's Anatomy by Doane, vol. iii., p. 309.

early life, therefore, during the act of vomiting, the pressure made upon the stomach by the surrounding organs must necessarily be greater than it is in the adult, and in consequence of this, the greater the ease with which the organ is evacuated.

In the second place, the shape of the stomach in the infant is more favorable to the easy evacuation of its contents. That the stomach undergoes successive changes in its shape, from birth onwards, is a fact, which although but recently investigated, is, I believe, well established, and for its elucidation we are indebted to the labors of Prof. Shultz of Germany. His attention seems to have been called to it from the peculiarities which he noticed in the shape of the stomach of those animals which vomit easily, and those which cannot be made to vomit at all. Thus for example, the horse, rabbit, hare, and guinea pig, cannot be made to vomit even by the most powerful emetics, while the dog and the cat throw up very readily—and he found that the shape of the stomach in the two sets of animals was entirely different, and that the same difference exists between the stomach of the child and the stomach of the adult. The former is more of a conical form, drawn out lengthwise, and gradually narrowing towards the two extremities. The œsophagus is inserted into the fundus at the left extremity, and at a distance from the pylorus, leaving the two curvatures of the stomach running almost parallel to each other. In short the stomach of the child resembles that of the carnivorous animals generally. The latter, i. e. the stomach of

the adult, is very different; it is more circular in its form, and the œsophagus, instead of being inserted into the left extremity, is in the middle, between the left extremity and the pylorus. The pylorus, too, is drawn back towards the cardia, so that the small curvature is very short, while the large curvature is greatly extended. The consequence of all this is, that the stomach of the adult has a rounder shape, resembling that of herbivorous animals generally. Now, according to Prof. Shultz, the stomach which approaches nearest to the cylindrical shape, must have its contents evacuated with the greatest ease;\* and this would appear to be the case, as a matter of course, whatever theory of vomiting may be adopted; whether performed, as some suppose, by the simple antiperistaltic action of the stomach itself; or according to Majendie, by the contractions of the diaphragm and abdominal muscles alone; or according to others, by the combined action of all these organs.

The foregoing considerations would seem to account very satisfactorily, both physiologically and anatomically, for the fact with which we started, that the mechanical act of vomiting is performed with greater ease in the child than in the adult. If vomiting, then, be induced in a child by mild agents, the whole process is performed with greater facility than by the adult. This, then, is the *first* peculiarity in the effects of Emetics in children.

If, on the other hand, *Emetics of an active and*

\* British and Foreign Medical Review, vol. ii., p. 537.

*debilitating character, and which produce much nausea, be used, the effects are more uncertain and energetic than in the adult.* The articles to which I allude, are the antimonial emetics, and these accordingly are frequently hazardous to young children, and that, too, when used in doses not peculiarly large. The immortal Sydenham seems to have been fully aware of this fact. In speaking of the continued fever of 1661, 2, 3, and 4, he says, "it has often been a difficulty with me, when called to infants and children in a fever, and observing an emetic indicated, whereby they might have been preserved from danger, that I durst not give them this infusion (*crocus metallorum*), for fear of a bad consequence."\* It will be recollected, that at this time *Ipecacuanha* had not yet been discovered. Dr. Clarke, of London, states that "a quarter of a grain of Tartrate of Antimony in solution, has been known to excite a vomiting which has ended in the death of a young child, which before was in no danger."† Dr. Armstrong observes that he "has seen again and again, delirium produced by antimonial preparations, given so as to excite the mucous membrane of the stomach and intestinal canal in very young children."‡ Dr. Hamilton advises, that "Tartar Emetic should never be given to infants, for alarming convulsions have followed its

\* The works of Thomas Sydenham, M. D., with notes by Benj. Rush, M. D. p. 18.

† Commentaries on some of the most important Diseases of Children. By John Clarke, M. D., &c., p. 33.

‡ Lectures by the late John Armstrong, M. D., p. 248.

use.”\* By Mr. Noble, of Manchester, a case is related, in which the death of a child, eleven months old, was owing to the effect of antimonial wine given as an emetic.† Mr. Wilton (surgeon to the Gloucester Infirmary) has also reported two cases of children, one a year old and the other four years old, which were manifestly destroyed by the use of antimonial wine given for ordinary colds. Slight convulsions—vomiting—diarrhœa—sudden prostration and death took place, notwithstanding the use of cordials and stimulants.‡ I have known a case occurring in this city in which the one-thirtieth part of a grain of Tartar Emetic given to a child a year old, laboring under croup, produced such severe and protracted vomiting, together with general prostration, as to require stimulants to save life. Some years since I was called to see a child, about three years old, who had been attacked with scarlet fever. The symptoms at first were mild, and no danger was apprehended in the case, when it was suddenly taken with such alarming symptoms of prostration as to call for a consultation. On inquiry, I found that the attending physician had been prescribing small doses of Tartar Emetic. Notwithstanding the use of stimulants, the child died in an hour or two after I saw it. I then suspected, and have since been confirmed in the cor-

\* A Treatise on the management of Female Complaints, and of Children in early infancy. By Alex. Hamilton, M. D., p. 353.

† Provincial Medical and Surgical Journal. By Robert J. N. Streeten, M. D. 1844, p. 47.

‡ Ibid, p. 204.



rectness of the suspicion, that the medicine had no little agency in bringing about the fatal result. The child was naturally delicate, and there certainly was nothing in the symptoms of the case to account for such a termination. The foregoing facts would seem sufficient to show the *uncertainty* as well as *energy* with which Tartar Emetic operates on the young subject, and the causes are obvious.

In the first place, Tartar Emetic is a powerful sedative, and it is well known, that in early life, the system cannot bear so well the operation of this class of agents, as it can in the adult. A striking illustration of this we have in blood-letting, when carried to the extent of producing syncope. Adults, as a general rule, recover very readily from this state ; children, on the contrary, recover very slowly, and there is always more or less danger to life either from convulsions or general prostration, and the same thing holds good in relation to Tartar Emetic. Besides this, Tartar Emetic frequently acts as a local irritant. From the delicacy of the mucous tissue in early life, it is of course more apt to act as such at that period, than it is in advanced years. In both these ways, it is evident that Tartar Emetic must necessarily prove more energetic in its action on the young subject.

In the second place, there is scarcely any medicine, whose action is more decidedly modified by the existing condition of the system than Tartar Emetic. In the ordinary state of the system, it acts as a sedative to the circulation, but at the same time causes, even in very moderate doses, nausea,



vomiting, sometimes free purging and diaphoresis. On the other hand, in certain states of the system characterized by high inflammatory action, very large doses and frequently repeated too, may be given without any other effect than that of lessening excitement, and curing the disease. Again, as soon as this state of excitement is subdued under the use of the remedy, all the ordinary physiological effects of it are reproduced. Under these circumstances the article can no longer be tolerated, and the use of it must be relinquished. All these interesting peculiarities are abundantly illustrated in the treatment of pneumonia, as first practised by Rasori in Italy, then by Laennec in France, and afterwards by numerous English and American physicians. Now, if Tartar Emetic is thus modified in the adult by the existing state of the system, how much more readily must all this take place in the young subject. In the successive changes taking place in the child in the different states of disease, from irritation to inflammation, it is hardly possible to estimate the degree of uncertainty attending the operation of this article.

Again, vomiting, we know, depends very much upon the existing condition of the nervous system. In certain conditions of the brain and nerves, it takes place very readily, while in others it is almost impossible to excite it, even by the most powerful means. For example, when the system is under the influence of some narcotic, such as opium, everybody is aware how difficult it is to bring on vomiting; and the same thing occurs in

other morbid states of the nervous system, such as apoplexy, &c. Notwithstanding this, it has been observed, that if under these circumstances, large quantities of Tartar Emetic be given, or if the use of it be too often repeated, although vomiting may not be induced, yet there may remain sensibility enough in the system to enable it to operate as a poison. An interesting case illustrative of this is related by Cloquet, of a person laboring under apoplexy, who received into his stomach upwards of forty grains of Tartar Emetic, without producing either nausea or vomiting. On dissection, besides the morbid state of the brain, extensive lesions were found in the alimentary canal, which were attributed to the action of the Tartar Emetic retained in the stomach.\* Dr. Christison quotes a case from the *Edinburgh Medical and Surgical Journal* (vol. vii., p. 305), in which a scruple of Tartar Emetic was given to a person poisoned by opium, without producing any effect as an emetic; sulphate of zinc was afterwards given, and with success. As he recovered from the effects of the opium, he was seized with pains in the stomach and bowels, and with tenesmus, which lasted several days.† Now, it must be evident that in the young subject, all these results are much more likely to occur, than in the adult.

While Tartar Emetic operates in this way on the young subject, Ipecacuanha is never known to

\* Paris and Fonblanque, *Medical Jurisprudence*, vol. ii., p. 280.

† *Elements of Medical Jurisprudence*. By T. R. Beck, M. D., and J. B. Beck, M. D. vol. ii., p. 586.

be followed by any injurious consequences. To the youngest infant it may be given not only with impunity, but frequently with the greatest benefit. Why this is so, must be manifest, if we reflect for a moment upon the peculiar properties of the two articles. Although both are emetics, yet they differ widely from each other in many important respects. The one is a mild article and limited in its operation to the stomach, upon which it never produces any thing like local irritation, even when given in large doses. The other, besides acting as a powerful emetic, is a direct sedative, capable of producing general prostration, and in some cases acting as a local irritant to the stomach and bowels, showing itself in excessive vomiting and diarrhœa.

With regard to the manner in which Tartar Emetic proves so dangerous to infants, it is probably more by its action as a sedative, than as a local irritant. This may be inferred from the symptoms attending those cases, as well as from the appearances on dissection. In the two cases recorded by Mr. Wilton already alluded to, the main symptoms were those of collapse, and on dissection no appearances of inflammation could be detected either in the stomach or intestinal canal. In the case, however, related by Mr. Noble, on dissection, evidences of local inflammation were found in the mucous membrane of the ileum.\*

The foregoing, then, appear to be the important peculiarities in the effects of Emetics on the young

\* Provincial Journal for 1844, p. 48.

subject. While vomiting, induced by ipecacuanha and other mild means, is performed with greater ease than by the adult and does not injuriously affect the system, the vomiting induced by Tartar Emetic is frequently followed by severe symptoms, and sometimes proves fatal.

Now the due understanding of these peculiarities is evidently of the highest importance in the use of Emetics in children, and upon the mind of the student and young practitioner especially, they cannot be too deeply impressed. From the manner in which medicines are treated of in classes, in most of the books of *Materia Medica*, and in the lectures on that subject, the student is insensibly led into the belief of a greater resemblance between them than really exists in nature, and it is only after he has had some experience of his own, that the error is corrected. He cannot, therefore, too early in his career, learn that all classifications are artificial—not founded in nature—that medicines are arranged in classes, merely for the sake of convenience, not because the articles under each class are precisely alike, but because they resemble each other in some one or more important feature, while in other respects they differ greatly. No two medicines, even in the same class, are precisely similar, and in acquiring a knowledge of them, the study of the points of difference is even more important than those in which they resemble each other.

From the foregoing considerations, the following inferences may be deduced.

1. As a general rule we need not be afraid of vomiting the youngest child, provided the means used be mild—such as ipecacuanha, &c. The mere act of vomiting is attended with no danger, while the remedial agency of an emetic is one of great power and value. Besides acting on the stomach, it extends its influence to the mucous membrane lining the pulmonary organs, promoting secretion in the first place, and then aiding in dislodging and ejecting morbid accumulations; accordingly, in pulmonary affections, there is nothing so efficacious.

2. The vomiting induced by the preparations of antimony ought to be resorted to with great caution in very young children, and should never be used except in those cases where a sedative effect is required, and can be borne with safety. Inflammatory excitement ought then always to be present to justify its use in a young child. Where the object is simply to evacuate the stomach, it ought never to be thought of. In such cases as croup and pneumonic inflammation, it may be justifiably and beneficially used. In these cases it will be found, that the system can bear the sedative influence of the article much better than it can in the ordinary conditions of the system. Even here, however, care should be taken not to push the article too far, as dangerous collapse has been known sometimes to be the result.

3. The *continued use* of Tartar Emetic in young subjects cannot be too specially guarded against. It is in this way, probably, that it is so apt to prove injurious. A single dose, even though it vomits



very freely, may be borne with comparative impunity, while the repetition of it may keep up nausea and intestinal irritation, so as to cause injurious prostration. This is very likely to happen in cases of a chronic character, like whooping-cough. Although mild emetics are among our best remedies in this disease, and where the subject is old enough, a single emetic of antimony is frequently exceedingly beneficial, yet the repeated use of antimonial emetics, as is too often the case, appears to me to be a great error in practice. It is not indicated by the nature of the symptoms, and violates a great rule which ought always to be observed in the management of chronic cases, and that is, not to break down unnecessarily the strength of the patient.\* Again, in ordinary catarrhal affections in children, a great deal of mischief is frequently done by the continued use of expectorant mixtures containing this active article. The Hive Syrup of Dr. Coxe, which is now in every family, and is given on the slightest occasions to infants, without even consulting a physician, has, I am convinced, done a great deal of harm. I say this without wishing to undervalue this preparation. In proper cases it is really a useful article, but persons out of the profession ought to know that its principal efficacy is owing to the quantity of Tartar Emetic which it contains, and that the indiscriminate use of it in

\* Dr. Armstrong says that "it is a most notorious fact, that the whooping-cough is far more fatal in London than in the country; and I believe," he adds, "that this arises from the very free use of antimonials in London." Lectures, p. 248.



cases where mild articles are required, must be injurious.\*

4. As the effect of Tartar Emetic on the system cannot always be measured by its emetic operation, even in the adult, this fact ought to serve as a caution against the too common practice of giving repeated doses of it to produce vomiting in children, when they happen to be narcotized. While it fails to vomit, it may still operate as a poison to the system. In all cases of this kind, the proper method of treatment is, not to push the emetic, but to endeavor to restore the sensibility of the patient, and then sometimes vomiting comes on at once.†

\* Every ounce of Coxe's Hive Syrup contains one grain of Tartar Emetic. My friend, Dr. McCready, has communicated to me the particulars of a case in which a child between four and five years of age, laboring under whooping-cough, manifestly sunk under the too frequent use of this article. The exhibition of it had been continued about eight days, when symptoms of intestinal irritation came on, accompanied with great general prostration, which in a few days ended the child's existence.

† The following case will illustrate more fully what I mean. Some time since I was called to a young child, to whom its mother had given twelve drops of laudanum, instead of paregoric. Discovering her mistake shortly after, and being alarmed at the effects produced on the child, she sent for assistance to a neighboring apothecary, who directed the administration of antimonial wine. A teaspoonful of this was accordingly given, but without the least effect in exciting vomiting. Shortly after this, and about one hour after the laudanum had been given, I first saw the child, and found it in a state of stupor from which it could not be roused by any ordinary means. With a view, if possible, of still exciting vomiting, I immediately administered a large dose of Ipecacuanha. After waiting for some time, and finding no effect, I commenced pouring cold water from a pitcher on the child's head, which was

5. In using Tartar Emetic in children, especial regard should be had to their constitutions. In those naturally delicate, and especially where the scrofulous diathesis exists, it should never be used if it can be avoided. Prostration is much more apt to ensue in them, and where the article is persisted in for any length of time, is sure to do harm. It is in such constitutions, when laboring under hooping-cough, and where the use of this article has been too long continued, that the baneful effects of it are most strikingly observed.

6. It is perhaps hardly necessary to say that if Tartar Emetic be an article of such danger, the younger the subject to whom it is given, the more likely is it to do harm. In children under a year, I should say, as a general rule, it ought never to be used. During that period the powers of life are too feeble to bear so active a remedy, at the same time that all the beneficial effects of an emetic may be gained from the use of ipecacuanha, or even milder means.

held over a tub. In a very short time the child seemed to feel the impression of the water, and exhibited symptoms of returning sensibility. On stopping the application of the cold affusion, it speedily relapsed into its former state of stupor. The water was again poured on the head, which soon roused it again, and during its use it vomited very freely. I now suspended its use for ten or fifteen minutes. Finding the symptoms returning, recourse was again had to the water, and with the same effect. It roused the child and again brought on vomiting. After this it gradually revived, and the next morning was as well as usual.

## ESSAY III.

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### ON THE EFFECTS OF MERCURY ON THE YOUNG SUBJECT.

In the previous essays, I have endeavored to point out the peculiarities attending the operation of Opium and Emetics, on the infant subject, as distinguished from the effects of these agents on the adult. I now propose to make some remarks on another article of even still greater importance, and that is *Mercury*.

That Mercury is an agent of immense power, either for good or evil, upon the human constitution, cannot be questioned. While in many cases it is the means of saving life, in not a few it unquestionably destroys it. If this be so, it becomes a question of the deepest practical interest, to determine whether its action is modified in any way by the age of the patient, and particularly so, when it is recollected that it is given by too many physicians, even more freely, and may I not add indiscriminately, to the young subject than to the adult.

*The first and most striking peculiarity attending the action of mercury, is that in young subjects, it*

*does not produce salivation so readily as it does in adults.* Indeed, under a certain age, it appears to be exceedingly difficult to excite salivation at all in them. On this point, besides our own experience, we have abundance of testimony. Dr. Clarke says, "under various circumstances he has prescribed mercury, in very large quantities, and in a great number of cases; and he never produced salivation, except in three instances, in any child under three years of age."\* Dr. Warren, of Boston, observes, "that he has never known an infant to be salivated, notwithstanding he has given in some cases, large quantities with this view."† Mr. Colles, of Dublin, says, "no man in the present day requires to be told that mercury never does produce ptyalism, or swelling and ulceration of the gums in infants."‡ Drs. Evanson and Maunsell speak still more strongly. They say, "mercury does not seem capable of salivating an infant. We have never seen it do so, nor are we aware of any such case being on record." "We have never succeeded in salivating a child under three years of age."§

The same general fact seems to be applicable to the external use of mercury. Dr. Percival, of Manchester, remarks, that he "repeatedly observ-

\* Commentaries on some of the more important Diseases of Children. By John Clarke, M. D. p. 182.

† View of the Mercurial Practice in Febrile Diseases. By John Warren, M. D., p. 146.

‡ Practical observations on the Venereal Disease and on the use of Mercury. By Abraham Colles, M. D., p. 171., Amer. edition.

§ Treatise on the Management and Diseases of Children, p. 88.

ed that very large quantities of the Unguentum Cæruleum may be used in infancy and childhood, without affecting the gums, notwithstanding the predisposition to a flux of saliva, at a period of life incident to dentition.”\*

That salivation does not take place so readily in the infant as in the adult, would seem then to be well established. That it never can or does take place, as might be inferred from some of the preceding quotations, is by no means, however, true; and the statement, if implicitly relied on, is calculated to be the cause of much mischief. That very young subjects do sometimes become salivated, is unquestionable. One case, and only one, however, has occurred in my experience, in which a child of two years of age was salivated, and that by a very moderate quantity of calomel, viz., five grains, given in three portions, at intervals, within the space of about twelve hours. In about two days after, the gums became inflamed, the tongue swelled, several ulcers appeared in the mouth, and the flow of saliva was free; after continuing about three days in the same state, it gradually yielded, and disappeared without any further inconvenience. In this case every thing seemed favorable to the development of mercurial action. The child had been laboring under hooping-cough for several weeks, and was a good deal reduced. It vomited freely with every paroxysm of coughing, and this no doubt aided in bringing on salivation, in a

\* Essays, Medical and Philosophical. By Thomas Percival, M. D., vol. 2, p. 318.



constitution peculiarly sensitive and evidently scrofulous. Nor is this a solitary instance. Dr. Clarke, already quoted, admits that in three cases, salivation was produced in children under three years of age. And similar cases have been observed by others. Dr. Percival relates the case of a child affected with Hydrocephalus, aged only seven months, in whom salivation was induced by rubbing ten grains of mercurial ointment into the thighs every three hours. After the use of two scruples of the ointment, the mouth became affected. The salivation was not violent, however, and had no effect in preventing a fatal result.\*

This, then, is a remarkable peculiarity in the action of this agent upon the infant subject, and the observation of it has doubtless led to the belief, too prevalent among some physicians, that it may be given to them to almost any extent with perfect impunity; an error, which, if not in its immediate, yet certainly in its remote effects, has been the prolific source of more mischief, probably, than any of us are aware of.

*Although mercury so seldom salivates infants, yet, notwithstanding this, it cannot be doubted that it affects the system profoundly, and even more so proportionally than it does the adult.* That it should do so appears perfectly natural, when we reflect upon the mode of its operation on the human system. On this subject, I am aware that a great difference of opinion exists. By some, mercury is

\* Essay's, &c., vol. 2, p. 409.



looked upon as a stimulant; while others view it as a sedative. A familiar acquaintance with its effects, however, will show, I think, that it may be the one or the other, according to circumstances—according to the dose in which it is given—the length of time it is continued, and more especially, the condition of the system at the time of using it. A single large dose of calomel will cause nausea and relaxation, and sometimes unpleasant prostration, while if it be given in smaller doses and repeated frequently, it will occasion irritation of the intestines, and general disturbance of the vascular and nervous systems. In the former case acting as a profound sedative, and in the latter as a stimulant, or rather irritant. That calomel given in large doses operates as a sedative, seems to be proved, not merely by the nausea and prostration which it frequently produces, but by other considerations. In dysentery, for example, in the adult, a dose of twenty grains of calomel will sometimes allay pain and irritation, with as much certainty as a dose of opium. For the purpose of testing the effects of calomel, some interesting experiments were made by Mr. Annesley, which would seem still further to show, that in large doses the action of this agent upon the mucous membrane of the stomach and intestines, is that of a sedative. He took three healthy dogs, and gave to one,  $\mathfrak{zj}$ . of calomel, to a second  $\mathfrak{zij}$ ., to a third  $\mathfrak{ziii}$ .. After this they were tied up in a room.

“The dog which took  $\mathfrak{zj}$ , did not appear to feel any kind of sickness, till six or seven hours after-

wards, when he vomited a little. He was lively the whole time, and ate his food well; had been purged two or three times; dejections of a black grey color.

“The dog which took zij was likewise lively, and ate his food well, vomited two or three times, and was purged more than the other; he passed tape worms and the dejections were black.

“The dog which took zijj. was heavy and apparently uncomfortable the whole day, and did not vomit at all; he was purged, and passed a very long tape worm; dejections also black.”

Twenty-four hours after they had taken the calomel, the dogs were all hung, and five minutes after they were dead, they were examined, and the vascularity of the stomach was found to be in the inverse ratio of the calomel they had taken; i. e. in the dog which had taken zijj., the vascularity was the least, and so on. For the purpose of comparing this with the condition of the stomach of a dog which had taken no calomel at all, an examination of another dog was made; and here the stomach was found to be *more vascular* than in any of the others. From these experiments, Mr. Annesley drew the conclusion, that “the natural and healthy state of the stomach and intestinal canal is that of high vascularity, and that the operation of calomel in large doses, is directly the reverse of inflammatory.”\*

The foregoing considerations would seem to

\* Transactions of the Medical and Physical Society of Calcutta, vol. 1, p. 211.

show that calomel in full doses is a local sedative, and in its general effects, is debilitating to the system at large. Hence its great utility and value as a remedy in many inflammatory diseases."

When, on the other hand, it is given in small and repeated doses, it acts not unfrequently as a local, as well as a general irritant, producing immoderate action of the bowels, and general irritation of the nervous and vascular systems. Now these, we know, are the effects observed continually in the adult, and it is but reasonable to suppose that all of them must, as a matter of course, be aggravated in the more delicate and sensitive system of the infant.

What shows incontestibly that the action of mercury is actually more energetic on the infant than the adult, is the fact, that when salivation does take place in the former, as it sometimes does, its effects are most disastrous. Sloughing of the gums and cheeks, general prostration and death are by no means uncommon occurrences. On this subject, Dr. Blackall justly remarks, "a general opinion prevails, that the constitutions of young subjects resist mercury. Its entrance into the system they certainly do resist, more than we could expect; but they are greatly overcome by salivations, and the possible occurrence of such accidents may well set us constantly on our guard."\* Dr. Ryan, too, says, "Ptyalism of infants is often followed by

\* Observations on the Nature and Cure of Dropsies. By John Blackall, M. D., p. 126.

sloughing of the gums and cheeks ; and this I have known to occur after the use of it in Hydrocephalus.”\*

Besides being more energetic in its action on the infant, mercury is also more uncertain. This must necessarily be the case, and for the same reasons that every other active agent is so. In the adult we know that mercury varies in its effects, according to the condition of the system, and the peculiarities of the patient's constitution. Thus some persons are salivated by the smallest quantity of this metal, while others resist the influence even of the largest quantities. In some, febrile action ; in others, diarrhœa and exhaustion take place, even from moderate doses. Hence it is, that every prudent physician, if unacquainted with the previous history of his patient, makes it a special subject of inquiry to ascertain whether he has ever taken mercury previously, and how it affects him. Now, in the young infant, of course, as we cannot so well have the benefit of this information, more uncertainty must necessarily attend its operation.

These, then, are the peculiarities attending the operation of mercury on young subjects, viz : that they are salivated with great difficulty, and that notwithstanding this, the effects of it are frequently more energetic and uncertain, than they are in the adult. And it is upon these as the basis, that I propose to make a few remarks bearing upon the practical application of it in young subjects.

\* Manual of Midwifery. By Michael Ryan, M. D., p. 477.

1. If salivation occurs so rarely in children under a certain age, then it is evident that it can never be made a criterion by which to judge of its influence on their systems. To attempt, therefore, to produce this effect, as we do in adults, is manifestly improper. In cases where it is desirable to get the system under the full influence of the remedy, other modes must be resorted to for the purpose of judging to what extent the use of the article should be carried. Now this is by no means easy. Even in adults, where we have the benefit of salivation as a test, all practical physicians are aware how difficult it is frequently, to decide when it is proper to stop the use of the remedy. How much more so must this difficulty be increased in the young infant, where we are left without this guide. The only modes of judging, of course, are the character of the evacuations from the bowels, and the general impression made upon the disease for which it is administered. Both these are evidently, however, uncertain. It is to be feared, therefore, that for the want of a more certain guide than we at present possess, the use of this remedy is, in many cases, unnecessarily protracted to the great detriment of the little patient. From all this the conclusion is obvious, that in the use of this article in the young subject much greater caution is necessary than in the adult.

2. The fact that mercury may prostrate and destroy a young child, even though it does not cause salivation, it is to be feared is not sufficiently ap-



preciated, at least by some. I have known calomel given without weight or measure, to a young child, and the reason assigned to justify it was, that it could do no harm, because it would not salivate. Now it appears to me that no opinion can be more unfounded, and no practice more mischievous. Although a single dose of calomel, even though large, may be well borne by children of ordinary strength of constitution, yet even this is not entirely safe in all cases. And when these doses are frequently repeated, particularly in delicate habits, the most serious consequences may result.\*

3. The use of mercury in young subjects as an alterative, should in all cases be conducted with great caution. There is no practice more common than that of continuing the use of this agent in small doses, for a considerable time, and certainly none which is more liable to abuse. Under the idea that the dose is so small and from no salivation appearing, we are apt to infer that even if the medicine is not doing any good, it is certainly

\* In his valuable little *Compend of Practice*, M. Bedingfield makes the following remarks: "Children will take an immense quantity of mercury without the salivary glands becoming affected. We ought not, however, on this account to give it incautiously; for it will sometimes happen, that without salivation, the parotid duct will be excited by it into violent inflammatory action, in which the parotid gland and the whole cheek will be speedily involved, and sphacelus, or rapid ulceration, will be the consequence. I have seen both cheeks entirely removed by this process. Nothing with which I am acquainted has the slightest tendency to check its progress." *A Compendium of Medical Practice*. By James Bedingfield. Am. ed., 1823, p. 170.



not doing any harm. Any improvement too, which occurs during the use of the article, is sure to be attributed to the silent operation of it on the system. Now although this is not unfrequently the case, yet it is not invariably so ; and every observing physician must have been aware of cases, in which, in this way, the article has been unnecessarily and injuriously continued. In bowel complaints, under the idea of altering the secretions, it has frequently, no doubt, helped to keep up the very intestinal irritation which it was given to correct. In other cases it has developed the latent tendency to other diseases, such as Scrofula, Phthisis Pulmonalis, etc. In adults we know this to be very often the case. How much more likely is all this to happen in the young infant.

4. In the use of mercury in young children, great care should be exercised in ascertaining, as far as possible, their constitutional peculiarities. This, of course, is not in all cases easily to be done. A good deal, however, may be learned from an acquaintance with the tendencies of the parents. Wherever the parents show indications of scrofula, or where there is an hereditary predisposition to consumption, great caution ought to be exercised in the use of mercury in their offspring.

5. Mercury should be administered with great caution, in cases where a child has been sick for a considerable length of time, and when the strength of the child has been very much reduced. In this state of constitutional depression, a single cathartic

dose of calomel sometimes proves fatal. We think we have seen more than one case, in which a child has been irretrievably prostrated under these circumstances, under the false impression that calomel is an innocent purgative to a child.

6. The too common practice of giving calomel as an ordinary purge, on all occasions, is certainly unjustifiable. From the facility with which it may be given, it is unquestionably resorted to in a great number of cases, where it is unnecessary, and in a great number where it positively does harm. The misfortune is, that its use is not limited to an occasional dose, but it is too often given in every slight indisposition of the child. Now, in this way, there can be no question that the use of it has laid the foundation for the ruin of the constitutions of thousands. It ought to be a rule laid down and rigidly followed, that in very young children, mercury ought never to be used as a cathartic, unless there is a special reason for resorting to it. In a great majority of cases, milder cathartics are decidedly to be preferred.

In concluding these observations, I trust it may not be supposed, that my intention has been to undervalue the importance of mercury as a remedy in the diseases of children. On the contrary no one appreciates it more highly than myself. In many cases, nothing can supply its place, and its judicious use has been, and is, the instrument of saving multitudes of lives. Notwithstanding, however, the many cautions to the contrary, it is to be

feared that the use of it is still too general and indiscriminate. Indeed, the amount of it which is taken by the human race in one way or other, is incalculable. What is given by regular physicians, is perhaps the smallest quantity. If the public really knew how much of this article is swallowed unknown to themselves, in the shape of bilious pills, worm lozenges, and the white powders\* of the Homœopaths, they would be amazed at their credulity in deserting their old medical advisers, because they have the boldness to give them an occasional dose, and the honesty to tell them so.

In addition to the peculiarities already mentioned in the preceding remarks, in relation to the action of mercury on the young subject, its effects when applied to the skin are not unworthy of notice. It is well known that one of the best modes of introducing mercury into the system, is by friction. On the infant subject, however, when applied in this way, it appears to operate even more kindly and efficiently than it does on the adult. This, therefore, is the best method of using it, where the constitutional effect of the article is needed in the young subject. On this point, the suggestions of Sir Benjamin Brodie are so important, that I cannot refrain from quoting them in full. "Children," says he, "when born, sometimes labor under syphilis, the father or mother having been affected with it—perhaps the father and not

\* Several cases have occurred in which these white powders have caused salivation.

the mother. The child, at birth, looks thin, and is of small size ; instead of thriving, it becomes still thinner. At the end of three weeks it is covered by a nasty, scaly eruption ; there is a sort of apthæ in the mouth, and chaps about the limbs and anus. I have tried different ways of treating such cases. I have given the child grey powder internally, and given mercury to the wet nurse. But mercury, exhibited to a child by the mouth, generally gripes and purges, seldom doing any good ; and given to the wet nurse, it does not answer very well, and certainly is a very cruel practice. The mode in which I have treated such cases for some years past, has been this : I have provided a flannel roller, on one end of which I spread some mercurial ointment—say a dram or more ; and I have applied the roller thus prepared, not very tight, round the knee ; repeating the application daily. The motions of the child produce the necessary friction, and the cuticle being thin, the mercury easily enters the system. This causes neither griping nor purging ; in a child, it does not even, in general, cause soreness of the gums, but it cures the disease. Very few of those children ultimately recover in whom the mercury has been given internally ; but I have never seen a single case in which this other method of treatment has failed.”\* A reviewer in the *British and Foreign Review* states, that the same mode has been resorted to by him in two cases of Hydrocephalus,

\* Braithwaite's *Retrospect*, vol. 9, p. 113, vol. 14, p. 134.

with decided success. In these cases, strong mercurial ointment was spread on each leg, every twelve hours, and covered with a stocking made to tie lightly above the knees.\*

\* Braithwaite, vol. 14, p. 134.

## ESSAY IV.

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### ON THE EFFECTS OF BLISTERS ON THE YOUNG SUBJECT.

It has frequently struck me that a treatise, describing with the necessary precision, the peculiarities of the effects of medicinal agents on the young subject, as distinguished from their effects on the adult, has long been needed in our profession. As yet I know of no such work. The systems of *Materia Medica*, valuable and elaborate as they are, and in which we should naturally look for the requisite information, are confessedly deficient on this subject. The consequence is, that the young practitioner who depends upon them, finds himself continually embarrassed in the treatment of the diseases of children, and he is obliged after all, to rely upon the incidental observations gathered from works on general practice, or upon the slow accumulations of his own experience. Even works professedly on the diseases of children, do not supply the want. They indeed specify doses suitable to the age, and now and then give cautions in re-



lation to the use of certain medicines, but they do not enter into the philosophy of the subject as it ought to be engaged upon. It is treated by them more as a matter of enlightened empiricism, than as one founded on sound and rational physiological and pathological principles. In some previous papers, I have endeavored to offer some contributions on this subject, and should they be the means of inducing some experienced hand properly to elaborate it, it appears to me that a greater practical benefit could not be conferred on the profession. On the present occasion, I propose to make *Blisters* the subject of a few remarks.

The first peculiarity attending the operation of blisters on the young subject is, *that they produce their effects in a shorter time than they do in the adult*. This is a fact well known to every practitioner. While in the adult, they do not produce their effects until from eight to twelve or even more hours have elapsed, in the child the same takes place in from two to six hours. In this respect there is a striking difference between blisters and most other remedies. Emetics and cathartics, for example, do not appear to act with any more rapidity on the child than they do on the adult. Now this fact, of the more prompt action of this class of agents, upon the child, although a simple one, is nevertheless one of great importance, and one which should be continually borne in mind. It has a practical bearing, not merely upon the mode of conducting the process of blistering in young

subjects, but also upon the use of it in their various diseases.

The second peculiarity is, *that the local inflammation produced by a blister is greater in the young subject than in the adult.* The reason of this is obvious. In infancy, the skin is more delicate in structure, has greater vascularity, and a higher degree of sensibility; all circumstances favoring the development of greater inflammation. The local impression, accordingly, made by a blister, is not merely more rapidly developed in the young subject, but it is also more intense.

The third peculiarity is, that in young subjects *blisters are more apt to be followed by the injurious consequences of inflammation, such as ulceration, gangrene, and even death.* Numerous and melancholy instances of this are to be found on record. Dr. Ryan, speaking of the use of blisters in children, says, "I have seen a blister on the chest followed by sloughing, and an aperture form over the epigastrium, which exposed the subjacent viscera."\* Dr. Thompson states, that he "has seen gangrene and death follow the application of a blister on an infant."† Dr. North states that he has "twice known infants destroyed in consequence of the sloughing of blisters, the progress of which could not be arrested."‡ Professor Chap-

\* Manual of Midwifery, &c. By Michael Ryan, M. D., p. 476.

† Materia Medica. By Anthony Todd Thompson, M. D. vol. ii, p. 535.

‡ Practical Observations on the Convulsions of Infants. By John North, p. 202.

man remarks, that in children a blister "sometimes induces gangrene, as I have witnessed in two or three instances."\* My friend Dr. W. C. Roberts informs me, that he has met with two cases in which children sank under the effects of blisters. Numerous other facts of a similar character might be adduced, to show the disastrous effects which sometimes result from the application of blisters to children; and to the minds of many physicians, it constitutes a serious objection to their use in their diseases. Dr. Armstrong says, "I have a great dread of the application of blisters to infants, on account of what is called the local and constitutional irritation."† Now these occurrences may and do take place also in the adult, but they are comparatively rare, and only under very peculiar conditions of the system. In infants, on the contrary, they are by no means uncommon. In any child, however healthy, they may occur from the simple cause of their being left on too long. They are more likely to take place, however, in certain conditions of the system or of the skin itself. Thus, for example, in cases where a child is greatly emaciated, or the constitution broken down from various causes, the inflammation of a blister is very apt to become unhealthy in its character, and to be followed by injurious consequences. Then again, where the skin itself is in a diseased state,

\* Elements of Therapeutics, &c. vol. ii, p. 28.

† Lectures, p. 362.

it is much more likely to happen than in the healthy conditions of that surface.

The fourth peculiarity is, *that the constitutional excitement produced by blisters is generally greater in young subjects than in the adult.* That this must necessarily be so, is obvious. In all cases, the general excitement must be in proportion to the degree of local irritation and the sensibility of the patient's system. If so, the general vascular and nervous excitement produced in the child by a blister, must, as a matter of course, be greater than in the adult. So powerful indeed is the impression thus made sometimes, that convulsions have been produced from this cause. Dr. North says: "I have frequently seen very severe paroxysms (of convulsions) brought on in consequence of their injudicious and unnecessary application."\*

From the whole of the foregoing, it is evident that blisters are much more powerful in their agency upon the young subject than upon the adult. They operate with more rapidity—cause a greater degree of local irritation and constitutional excitement—and their operation is frequently followed by consequences which rarely occur in the adult.

In the use of these agents, the practical bearing of these facts should be continually borne in mind.

1. If blisters are more powerful in their action upon children than adults, then it would seem to follow that they may be rendered more efficient

\* Observations on the Convulsions of Infants. By John North, p. 209.

as a means of cure in their diseases. And such appears to me to be really the fact. In all cases, where their revulsive agency is required, and where they are properly applied, it has struck me, that more decided benefit has resulted from their use in children than in adults, and that too, under circumstances as nearly similar as they well could be. Besides acting more powerfully, the rapidity of their operation in children, gives them a great advantage in many cases. We all know that one of the great objections to a blister in the adult, sometimes at least, is the length of time which it takes to produce its effects. In a child this is in a great measure obviated, and we have in a blister not merely a powerful but a comparatively speedy counter-irritant. As remedial agents therefore, in the diseases of children, it seems to me they ought to hold a high rank. I am aware, that by some an opinion, entirely the reverse of this is entertained. Mr. North, in his valuable work on the Convulsions of Infants, states that he thinks, that except as stimulants, in depressed states of the system, blisters are altogether objectionable in the diseases of children. As revulsives in cases of local inflammation, he regards them as having gained a character which they do not merit, and that in fact they do more harm than good. On this subject he says, "the period at which we apply blisters in local inflammatory affections is not to be forgotten. We first subdue the severity of the disease by other and appropriate remedies, and when it is upon its decline, when in all probability the unas-



sisted powers of nature would successfully perform the remainder of the task, a blister is applied. The patient gets well, notwithstanding the additional pain thus inflicted ; and the fortunate result of the case, which is really to be attributed to the measures previously employed, is said to be owing to the good effects of counter-irritation, &c., and the blister gains a character, to which in point of fact it has no claim.”\* Now all this may no doubt be true in some cases, but that it is so generally, can hardly be admitted. It should be recollected, that in the treatment of local inflammations, blisters are only auxilliary remedies. Of themselves, and alone, capable of doing but little, and yet when co-operating with other agents, such as blood-letting, &c., exceedingly powerful and valuable. Every one knows that there are periods and conditions in the career of inflammatory complaints, when bleeding and other reducing remedies have been carried to the fullest extent deemed advisable, and yet sufficient disease may remain, if not to destroy life, yet to render convalescence tedious, or to lay the foundation of subsequent chronic disease. This of course it is all important to obviate. Now it is just under this condition of things that blisters come in with great effect, and frequently break up completely the remaining vestiges of disease, and in this way I look upon them as remedies, acting with more power and efficiency in children even than in adults.

\* Observations on the Convulsions of Infants. By John North, p. 205—6.



2. From the fact of blisters being such powerful agents, and especially from the fact of their being so liable to be followed by dangerous consequences, more caution is required in their use in children than in adults. Important and valuable as they are and may be made, if properly used, their indiscriminate application cannot be too much reprobated. Just in proportion to the good they are capable of accomplishing, under proper circumstances, is the evil which results from them, if heedlessly or injudiciously resorted to. It is to be feared that this is not always borne in mind as it should be. As a general rule, they should never be resorted to, especially in very young children, unless some decided benefit is anticipated from them.

3. The mode of conducting the process of blistering in a young subject is a matter of greater nicety, and should call for the utmost care on the part of the practitioner. As one of the principal causes of gangrene, is the leaving the blister on too long, this is a point which should be specially attended to. To many this may appear a small matter, but it is really one of great moment, and in relation to which I am sorry to say that the directions given in many of our practical works are so discordant, as to be very poor, if any, guides to the young practitioner. By way of illustration, I will quote a few of them. Dr. Armstrong says, "from twelve to sixteen hours is generally sufficient for the application of the blister in adults, and half

that period in children.”\* Dr. Williams says, that “to avoid gangrene in children, it is advisable never to allow the blister to remain on more than six hours.”† Dr. Dewees states that “in children, the blister is frequently found to have performed its duty in eight hours, and very often in six. It should therefore, always be examined at these periods, and dressed, if sufficiently drawn; if not, it should be suffered to remain until this takes place.”‡ Evanson and Maunsell say, “in no instance is the blister to be left on more than a few hours (from two to four)—not longer, in fact, than until the skin is reddened, when vesication will follow; but this result should not be waited for, as attendants always will do, unless the most express directions to the contrary be given.”§ Neligan directs that “as a general rule, in infants and young children, blisters should only be left on until redness of the surface is produced, when the application of a warm poultice to the part will cause vesication.”|| Ballard and Garrod remark, that in children a blister should not be allowed to remain on longer than to produce redness of the surface; and they add, “in very young infants, it

\* Lectures, &c. By John Armstrong, M. D., p. 362.

† Cyclopædia of Practical Medicine. American Edition. Vol. I., p. 529. Art. Counter-irritation.

‡ A Practice of Physic. By Wm. P. Dewees, M. D., p. 28.

§ A Practical Treatise on the Management and Diseases of Children. By R. T. Evanson, M. D., and H. Maunsell, M. D., p. 107.

|| Medicines, their uses and mode of administration. By J. W. Neligan, M. D., p. 202.

has appeared to us doubtful whether even redness should be permitted to occur before its removal."\* The foregoing is a sample of the discrepancy of opinion in relation to a most important point of practice, and one confessedly, too, not unfrequently involving the life of the young subject, as advanced by authors of the highest respectability, and who may be supposed to exert a wide influence in guiding the practice of young beginners in our profession. The fact is, and this perhaps may account somewhat for the difference of opinion just noticed, that no positive rule can be laid down in relation to the precise time that a blister should be left on a young child. From the original differences in the sensibility of the skin in children, the period must necessarily vary, and the only safe general rule, is to be governed by the actual effect produced. For this purpose the blistering plaster should be raised at suitable intervals and the state of the skin observed. And the safe plan is, according to the directions of some of the authors quoted above, to remove the blister as soon as the surface appears uniformly red, and then to apply a soft poultice. In most cases this will be followed by suitable vesication, while any injurious consequences will be averted.

It is not my intention in this paper to go into the minutiae of conducting the process of blistering, but there is one other point which I cannot help noticing, and that is, the practice which is so com-

\* Elements of Materia Medica and Therapeutics. By Ed. Ballard, M. D., and A. B Garrod, M. D., p. 457.

mon with some of covering the blistering plaster with dry fly-powder. Although intended to make the blister more potent, it frequently has a directly contrary effect, from the fact that the blister does not adhere so closely to the skin ; over and over again have I seen blisters prepared in this way fail in producing the desired effect, although left on even longer than the usual period. Then again, the dry powder is apt to adhere to the skin after the blister is removed, and in this way strangury is more likely to be produced. In one case, according to Ure, sphacelus has occurred from this cause.\* As apothecaries are very apt to prepare blisters in this way, it is important that practitioners should be on their guard to prevent it. With regard to the dressing of a blister, always a matter of importance to the young subject, and frequently so to the adult, I would call the attention of the reader to a mode very recently recommended by Dr. D. Maclagan, of Scotland, which holds out many advantages over the ordinary method. After leaving the blister on for a suitable time, he applies a poultice of bread and milk for two hours. After discharging the serum, a thick layer of soft cotton wadding is applied over the part, with the undressed or wooly surface next to the skin. If in the course of a few hours this should become soaked with the serous discharge from the blister, so much of the cotton may be removed as can be done without disturbing the

\* A Practical Compendium of the Materia Medica, &c. By Alexander Ure, M. D., p. 31.

loose epidermis beneath, and the whole again covered with a dry layer of cotton. This is all the dressing which in general is requisite. The cotton is allowed to stick to the skin of the blistered part, and when a fresh layer of epidermis is formed, which takes place very readily, the old epidermis and cotton come off together, leaving a smooth whole surface below.

The advantages of the above mode, according to Dr. M., are first, "that it renders the blister much less painful and annoying to the patient than when unguents are used. The tenderness in fact, is comparatively so trifling, and the protection by the cotton so good," he says, "that I have been enabled without annoyance to the patient to percuss freely, and apply the stethoscope firmly over blistered parts, which had been dressed for the first time only an hour or two previously; secondly, the blisters heal faster under it than under dressings with cerate: for although the cotton may remain adhering for some days, I have generally found, that within twelve hours the patient ceases to feel the blister a source of annoyance. Lastly, it dispenses with the greasy applications so disagreeable to patients of cleanly habits."\*

4. To obtain the good and avoid the evils of blisters, it is evident that a nicer discrimination of the conditions of the system is necessary in the use of this class of agents in children than in adults. Long experience has established the fact that it is

\* Edinburgh Monthly Journal of Medical Science, May, 1847, p. 834.



only under certain states of the system, that blisters can be used with any prospect of advantage. If this be true in the adult, it is doubly so in the young subject, and any mistake in this respect is much more likely to be followed by injurious consequences in the latter than in the former. Now the conditions which influence the effects of these agents, are the state of the skin, and the state of the nervous and vascular systems. With regard to the skin, it may be laid down as a general rule, that when blisters are used as revulsives, the part to which they are applied should be as nearly as possible in a state of perfect health. In this state, the irritation of blistering may be established even in a child with comparative safety. On the contrary, when the skin is in a morbid state, ulceration and gangrene are by no means unusual occurrences. All this is occasionally illustrated in scarlatina and measles. Mr. Pereira mentions that he has seen "two instances of death from the gangrene caused by applying a blister after measles."\* My friend, Prof. Dunglison, in his valuable work on *Materia Medica*, states that he has seen "several cases of death manifestly caused by the use of blisters in scarlatina and measles."† Other facts of a similar character might be adduced, but the preceding are sufficient to show the tendency which there exists in this state of the skin to take on unhealthy inflammation. And the reason is to be sought for in

\* *Materia Medica*, Vol. II., p. 775. American Edition.

† Vol. II., p. 219.



the changed condition of the skin. During the febrile stage of these diseases the skin is preternaturally injected and excited. As soon as the fever subsides and the eruption recedes, the skin is left in a state of debility—a state in which, as we all know, inflammation is very likely to terminate unfavorably. I hope it may not be inferred from the preceding, that I mean to express the opinion that blisters ought never to be used in such cases as measles and scarlatina—but the possible occurrence of such consequences ought to make us exceedingly cautious about the manner of using them, and indeed ought to deter us from using them at all, unless under a manifest necessity. In every case, therefore, before applying blisters to young children, the condition of the skin ought to be attended to.

With regard to the state of the system, this is even still more necessary to be inquired into. Indeed this is all important, if we hope to realize any of the expected benefits from these agents. Now there are two states of the system almost equally unpropitious to their use—and these just the reverse of each other. The first is that in which high inflammatory excitement is present. That this is unfavorable to the legitimate operation of a blister as a revulsive, is obvious, if we reflect for a moment upon the effects of this agent. These are, local irritation and general excitement. Now in all cases where an internal inflammation exists, the difficulty of resolving it by any means will be proportioned to the degree of general excitement

accompanying it. If a blister be applied where this general excitement is already very great, one of the necessary consequences will be to augment this so greatly as to counteract, in a greater or less degree, according to circumstances, the beneficial effects of the blister as a revulsive. Under this condition of things, the internal inflammation will be aggravated instead of abated, in consequence of the increase of general excitement. Hence the fact has been generally observed, that if blisters are applied in the early periods of inflammatory complaints, or before suitable evacuations have been resorted to, they frequently do more harm than good. They merely add fuel to the fire.

On the other hand, a state of great constitutional exhaustion and emaciation is also unfavorable to their operation. The reason here, however, is entirely different from that in the preceding case. The danger here is that from the impaired state of the vital energies, the local inflammation of the blister may be followed by ulceration, gangrene and death. In the use of blisters, therefore, both these extremes should be carefully avoided. With regard to the condition most propitious to their use, it is that in which the general excitement is rather below than above the natural standard. When this is the case, there is less danger from any increase of excitement, while the system is in the state most favorable to the transfer of irritations from one part to another. Now all this is applicable to the adult, and we can easily see how much

more so it must be in the case of the irritable and sensitive infant.

5. In the use of blisters in children, especial reference should be had to the peculiarities of their temperament and constitution. This is more important perhaps than it may at first sight appear. Every practitioner must have observed the extreme suffering which adults sometimes undergo from the irritation of blisters. In nervous and irritable habits I have myself seen a state of things thus induced, little short of phrenzy. In children of nervous temperaments all this is much more likely to happen, and accordingly greater caution should be exercised.

If the foregoing conclusions be founded in truth, they would seem at once to expose the impropriety of the practice of resorting to the use of blisters on every trifling occasion, in the management of the diseases of children. There is an opinion prevalent—how it has originated I know not, that blisters are innocent remedies—if they do no good, they can do no harm. Now this is unquestionably a great error, and has been productive of vast mischief. Independently of the unnecessary suffering which they may occasion, they sometimes produce death by the manifest causes of ulceration and gangrene, while in others they insiduously aggravate the disease they were intended to relieve.

## ESSAY V.

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### EFFECTS OF BLOODLETTING ON THE YOUNG SUBJECT.

THERE is no subject, perhaps, so deeply interesting to the practical Physician, as the effects of Bloodletting on the human system, and the various uses to which it may be applied in the management of disease. In promptness and power, it exceeds all other agents, and its capacity for doing good or harm is proportionally great. It is resorted to, also, at every period of life, and by some it is even prescribed with equal, if not more freedom in children than in adults. It becomes then, a question of the greatest moment to determine, if possible, whether the age of the patient has any influence in modifying its effects. And this is the subject upon which I propose to make a few remarks.

That the youngest child can sustain the loss of blood within certain limits, as well as the adult, is manifest from a variety of facts. Thus children are sometimes born in a state of asphyxia from apoplexy. On dividing the cord and letting a

moderate quantity of blood flow, respiration is established, and every thing does well. Again, not unfrequently, from not applying the lig ture sufficiently tight around the cord, or from the cord contracting and thus loosening the ligature, hæmorrhage takes place, and yet no injurious consequences result. Besides this, we know that in cases of disease, the youngest child may be bled, not merely without injury, but with advantage. When, however, the loss of blood is carried beyond these limits, important peculiarities are observed, showing a difference in the effects produced in the young subject, from those in the adult.

*The first peculiarity is, that the young subject does not bear the loss of considerable quantities of blood, so well as the adult.* I am not aware that children fall into a state of syncope from the loss of blood more readily than adults ; but when syncope does come on, it is very certain that they do not recover from it so readily, and they are always in more or less danger. In the adult, syncope from the loss of blood, unless the quantity be very large, is a state which, as a general rule, is attended with little or no danger, and from which the patient speedily recovers. Hence it is that physicians are continually in the habit of inducing it in the management of certain forms of disease, and not merely with impunity, but evident advantage. In the young subject it is not so, and it is a state always attended with hazard. If the child recover from it, it does so very slowly, and every now and then it sinks irretrievably under its influence. That



this is a fact, is confirmed by abundant testimony, on the part of those who have taken the trouble to make the necessary observations. Dr. Marshall Hall, in speaking on this subject, says, "In infancy, the state of syncope (from the loss of blood) is a state of danger."\* Evanston and Maunsell remark, "As a general rule, it is well to stop the flow of blood when decided pallor takes place, without waiting for actual fainting, from which children do not quickly recover."† Armstrong says, "Do not bleed to actual syncope in children, as they are apt to fall into convulsions, of which they may die. Children do not recruit from very large bleedings like adults."‡ Dr. Ryan observes, "The abstraction of blood in cases of infants and children until fainting occurs, is the worst practice that can be imagined, as convulsions or death may be produced."§ Indeed, the general fact admits of no question; and the reason is obvious enough, if we reflect for a moment upon the nature of the agent, and at the same time compare it with the susceptibility of the subject. Carried to the point of syncope, blood-letting is one of the most direct, speedy, and profound sedatives that we have in our possession. In a few moments, it reduces the subject from a state of perfect health or the high excitement of disease, to the state of temporary death. Now it

\* Researches on the Morbid and Curative Effects of the Loss of Blood. By M. Hall, M. D., p. 87.

† On the Management of Diseases of Children, p. 107.

‡ Lectures, &c., by John Armstrong, M. D., p. 387.

§ Manual of Midwifery. By M Ryan, M. D., p. 475.



is very evident that the capability of recovering from such a state, must be just in proportion to the powers of the constitution. From the very nature of its organization, therefore, it is obvious that the system of the child cannot sustain so well as the adult a shock so sudden and powerful as this.

*The second peculiarity attending the loss of blood in the young subject, is, that the nervous system is more powerfully affected than in the adult.* The evidence of this is, that convulsions and coma more frequently occur after the loss of blood in children, than in adults. In the adult, both these occurrences sometimes take place, more especially convulsions. Thus, for example, puerperal hæmorrhage is not unfrequently followed by them. I have witnessed the same thing in a gentleman of irritable habit, who had been bled too largely from the arm. He had lost about a quart of blood, when incipient syncope came on, followed immediately by a violent convulsion. In children, however, these occurrences are much more common; and the reason, no doubt, is the greater predominance, as well as impressibility of the nervous system. A great variety of causes, we know, will induce convulsions in a child, and among these, exhaustion is a very common one. With regard to coma, too, this may be brought on in children by any debilitating cause. A striking illustration of this we see now and then in diarrhœa, which has been continued too long. In these cases, the brain becomes suddenly affected, and a state of stupor or coma is induced, which is not unfrequently mis-

taken for Hydrocephalus. The same thing occurs from the loss of too much blood.

*The third peculiarity is, that the repetition of bloodletting is not so well borne by the child as the adult.* A child of good constitution and ordinary strength, may bear a first bleeding, perhaps quite as well as an adult. Under peculiar circumstances, too, of disease, a second may be borne very well. Beyond this, as a general rule, it will be found, I think, that the child cannot well sustain the loss of blood. On this point, I believe, there is little or no difference of opinion among men of judgment and observation. Dr. John Clarke observes that "Very young children bear very well the loss of blood even to fainting, once or twice, but they ill bear a more frequent repetition of bleeding. Their powers sink under it, and by no art can it be replaced."\* Marshall Hall says, "In infancy a second or a third bloodletting is borne with difficulty."† Evanson and Maunsell say, "Repetitions of bloodletting are not well borne by the child."‡

*The fourth peculiarity is, that the effects of local bloodletting, especially leeching, are different upon the child, from what they are upon the adult.* In the adult, the effect of leeching is in a great measure local, and it is not usually resorted to until after general bloodletting is considered inadmissible. In a child, on the contrary, it produces very much

\* Commentaries on the Diseases of Children, p. 103.

† Researches on the Loss of Blood, p. 87.

‡ On the Diseases of Children, p. 108.

the same effect as a general bleeding. From the greater vascularity of the skin, too, the amount of blood lost by a leech, applied to a young subject, is much greater than in the adult, and it is frequently much more difficult to arrest the hæmorrhage from it. The general effect, then, of leeching, on the young subject, is much greater than upon the adult. Hence it is that cases are so frequently occurring, in which children die from leeching. Of this we have numerous cases on record. Dr. Christison says, "I have twice known children bleed to death in Hospital practice, the nurse having labored under a common prejudice among their craft, that leech-bites cannot bleed too much."\* Pereira states, that "in two cases of infants, I have seen exhaustion with insufficient reaction, consequent on hæmorrhage after a leech-bite, terminate fatally."† Ryan says, "The loss of blood from a single leech-bite has caused the death of a child."‡

From the foregoing, then, it would seem, that although a child may sustain the loss of certain quantities of blood, perhaps quite as well as the adult, when carried beyond this, they do not bear it so well, nor do they bear the repeated and continued loss of blood so well; and under these circumstances, dangerous and even fatal consequences are apt to ensue. In other words, bloodletting is an agent which operates with more power,

\* Dispensatory, p. 492.

† Materia Medica, Vol. II., p. 769:

‡ Manual of Midwifery, p. 475.

and is attended with more danger in the child than in the adult.

If all this be so, the following deductions necessarily follow.

1. Great caution should be exercised in bleeding children to the point of syncope. If the state of syncope be attended with the danger already alluded to, it is very certain that nothing can justify us in producing it, unless it be determined that it is essential to the management and cure of the case. Now, that in most cases, even of decided inflammation, it is not necessary to carry bloodletting to this extent, is very certain. We know that it is not so in the adult, and it evidently cannot be so in the child. As a general rule, therefore, it cannot be required. By some high authorities, however, it is supposed that under certain conditions of diseased action, the safety of the patient depends upon the production of syncope. Thus, for example, incroup, bleeding *ad deliquium* has been insisted upon by the late Dr. Bayley of New York,\* Dr. Dick of Alexandria,† and Dr. Ferriar of Manchester. The latter especially speaks of it, as “the essential point of the cure, without which no relief can be effected.”‡ If in any disease the practice be justifiable, it certainly is in this, and it cannot be denied, that in a great number of instances, it has been resorted to with

\* New York Medical Repository, Vol. XII., p. 331.

† Barton's Med. and Phys. Jour., Vol. II.

‡ Medical Histories and Reflections, by John Ferriar, M. D., p. 371. American Edition.

safety. Notwithstanding this, general experience has abundantly established the fact, that even here it is not necessary, and that all the beneficially sedative effects of the remedy may be obtained, without going to this extent. On this point, there appears to be, at the present time, a pretty general concurrence of opinion among enlightened practitioners, and the rule of practice ought to be, *never* in any case to bleed to syncope, but to stop as soon as paleness of the lips and cheeks comes on. In this way, all the good of bloodletting is secured, while the risks of syncope are avoided.

2. To determine the precise amount of blood proper to be drawn, is a matter of much greater nicety, and involves more serious consequences in the child, than in the adult. In the adult, the loss of a little more blood than is necessary, as a general rule, is a matter of no very great consequence. In the child, on the contrary, it may prove fatal. In the adult, too, we have means of judging how far it ought to be carried, which we have not in the child. Thus, for example, the pulse, which in the adult is so valuable a guide in these cases, cannot be depended upon at all in the child. It is always, therefore, a very nice and difficult problem in practical medicine, how to adjust properly, in a child the amount of blood necessary to be drawn, to the exact wants of the case. Now there are only two ways in which this can be done. The first is, by fixing upon a certain amount as suitable to different ages. The second is, to judge by the actual effects produced at the time of taking



the blood. With regard to the first of these modes, it is evident that it must be a very unsatisfactory guide, if we recollect that no two constitutions are precisely alike, and that there is every difference in the capacity of different systems, even in the same disease, to bear the loss of blood. Then, again, the same disease exists in different degrees of violence, and of course requires a modification in the amount of depletion. Besides all this, different diseases do not require and cannot tolerate the same loss of blood. A general standard, then, founded upon the age of the patient, is really good for nothing, except as a mere approximation. In individual cases, it must be inapplicable. Hence it is, that all those standards laid down by authors, differ so much from one another, and must necessarily do so. If blood be taken by *leeches*, the difficulty is still further increased, from the circumstance that the desired quantity can hardly ever be obtained with any degree of precision: if it is so, it is purely by accident. That this must be so is evident, if we recollect the variable quantities of blood drawn by the leeches themselves, and more especially the greater differences in the after-bleedings. It is not yet settled, I believe, exactly how much blood a leech will draw. Christison says, "Twice as much blood may be usually drawn by fomentations, as by the suction of the leech. A single leech, when applied successfully, may thus be held to draw, from first to last, *about half an ounce of blood on an average*."\* According to

\* Dispensatory, p. 492.



Evanson and Maunsell, "the quantity of blood obtained by a good leech, allowed to bleed for half an hour, may be estimated *at one ounce*."\* Pereira says, "I believe *four drachms* to be the maximum. On an average, I do not think we ought to estimate it at more than *a drachm and a half*;"† i. e., the quantity taken by the leech itself, without reference to the after-bleeding. Now the fact is, it is impossible to specify the amount of blood drawn, either by the leech itself or in consequence of the subsequent bleedings. Leeches differ in their size very greatly, and there must, of course, be a great difference in the quantity of blood they are capable of taking. Then, again, there is every difference in the after-bleedings, depending on the vascularity of the skin, the part of the body to which they are applied, and various other circumstances. From all this, it is evident how unsafe it must be to draw blood from a child, according to any average standard.

With regard to the second mode, that of judging of the extent to which it should be carried by the effects produced at the time: in many cases this answers exceedingly well. In inflammatory complaints, where the full effect of the loss of blood may be necessary, the rule can be satisfactorily applied, and the best plan is to bleed in the erect posture, until pallor of the face comes on, without producing actual syncope. In the adult, according

\* Practical Treatise on Children, &c., p. 106

† Materia Medica, Vol. II., p. 769.

to Marshall Hall, the production of actual syncope constitutes the criterion as to the exact amount which the case requires, as well as of the capacity of the system to bear the loss of blood, and therefore he recommends this as the rule for the due administration of the remedy. Now, that this will not answer, must be obvious to every one. Every practitioner knows that cases are continually occurring, in which actual syncope comes on after the loss of a few ounces of blood, when large quantities are afterwards required to be drawn. In children, of course, the rule cannot be applicable. In them, the loss of so much blood as to bring on only approaching syncope might not only be unnecessary, but be attended with danger. From all this, then, it would appear that we are not in possession of any precise mode of determining how much blood ought in all cases to be taken in children; and this shows the necessity of great caution and the exercise of sound judgment, in the use of the remedy.

3. From the uncertainty in estimating the quantity of blood lost by leeches, and the dangers attending the loss of too much from them in children, too great caution cannot be exercised in their use. From the manner in which leeches are ordered by some physicians, in the diseases of children, one would be led to suppose that no harm could ever result from them. From the ease, too, with which they may be prescribed, and the appearance of energy which it gives to the practitioner, it is to be feared that not unfrequently they are used with-

out being actually necessary, and even when necessary, they are suffered to draw blood without sufficient regard to the quantity which may be lost. Now it should always be recollected, as already stated, that leeches operate differently on the child from what they do on the adult. In the latter, they are in a great measure local in their action, and may be, and generally are used, when general bleeding is contra-indicated. In the child, on the contrary, they act in the same way as general bleeding. Their sedative effects, therefore, upon the constitution of the child, are much greater; and if suffered to bleed beyond a certain limit, they endanger life. On these accounts, it is more necessary to be cautious in the use of them in children, than in adults. It is not my intention to go into any particulars, in relation to the mode of conducting the process of leeching. There are a few points, however, of a practical character, connected with this subject, which may not be unworthy of notice. 1. When leeches are applied to a child, the patient should always be placed in the erect posture. The same rule indeed should be observed, in whatever way blood is drawn. If it be a fact that leeches act like general bloodletting upon the child, the propriety of this rule must be obvious; and it is the more necessary to insist upon it, because it is hardly ever observed. As soon as any paleness of the lips or face appears, the child should be placed in the recumbent posture, and the bleeding arrested. 2. When leeches are applied to a child, the patient should never be left

until after the flow of blood is completely stopped. 3. Leeches should never be applied at bed-time, and suffered to bleed during the night. In this way, the patient has, in more cases than one, bled to death. If applied late at night, they should be watched just as in the day time. 4. As a general rule, leeches should not be applied to soft parts destitute of support from underneath, in consequence of the difficulty of making pressure sufficient to arrest the hæmorrhage. The importance of this was first noticed by Dr. Cheyne, who advises them to be applied in croup, not to the neck itself, but over the clavicle, sternum, or ribs.\* 5. Leeches sometimes open into arteries, and dangerous hæmorrhage has ensued from this cause. A case of this kind happened, in which the temporal artery was thus opened, and Sir Astley Cooper was obliged to divide the artery before the hæmorrhage could be arrested.† In all cases, therefore, the progress of the bleeding should be carefully watched.

4. If bloodletting be so profound a sedative to children, it is evident that it is capable of doing a vast deal of harm in cases unsuited to its use, and that it requires a very nice discrimination of the character of the case, before it can be used with safety. This may appear very commonplace ; but, commonplace as it is, it is to be feared that it is not sufficiently borne in mind in actual practice. The presence

\* Pathology of the Larynx and Bronchia, by John Cheyne, M. D., p. 57.

† Johnson's Med. Chir. Rev., Vol. IX., p. 71.

of inflammation or congestion is generally considered a condition justifying and requiring a resort to bloodletting, and so indeed, as a general rule, it is ; but it is not so universally. Thus, for example, the inflammation attending scarlatina does not usually require or bear well the loss of blood ; and there can be no question that, in this complaint, many a child has been sacrificed by a resort to this remedy. Then, again, symptoms analogous to those produced by inflammation or congestion result from a cause directly the opposite, viz : irritation or mere exhaustion. Illustrations of this we see frequently in affections of the head in children, convulsions, &c. In these cases, if the cause of the difficulty be mistaken and depletion be restored to, the result may be fatal. All this shows that, before bloodletting is used in children, the nature of the case should be investigated more nicely even than in the adult.

5. In the use of bloodletting in the young subject, especial regard should be had to their constitutions, as well as their mode of living. No principle is better understood, or ought to be so, even in adults, than that in the use of debilitating remedies, due regard should be had to the powers of the system. No practice is safe which does not take into consideration the relative capacity of the system to bear them ; otherwise the remedies may be more fatal than the disease for which they are prescribed. Now we know that in the adult there is every difference in this respect. In the management of the same disease accordingly in differ-



ent individuals, a very different course of treatment is necessary, if not in the remedies themselves, at least in the extent to which they are carried. In the young subject this is still more necessary. Children whose constitutions are naturally feeble and vicious, or who have been enfeebled by debilitating causes, such as poor diet, confined air, &c., sink very readily under the influence of depressing remedies. In these bloodletting is badly borne, and should never be resorted to unless absolutely necessary, and then in moderate quantities.

6. Great caution should be exercised in the repetition of bloodletting. After what has been already said in relation to the effects of repeated bloodletting on the young subject, I should not again allude to it, were it not to notice the opinions of an eminent authority. Dr. Rush, in his "Defence of Bloodletting," makes the following statement: "I could mention many more instances in which bloodletting has snatched from the grave children under three or four months old, by being used three to five times in the ordinary course of their acute diseases."\* That the children alluded to by Dr. Rush survived this treatment I do not doubt; but that these repeated bleedings were necessary, I can hardly believe. At any rate, a practice like this, if generally adopted, would, in my humble opinion, end in the most disastrous results.

In concluding this paper, I trust it may not be thought that I am opposed to the use of blood-

\* Med. Obs. and Inqs. Vol. IV., p. 300.



letting in the 'diseases of children. The physician who discards this agent, understands but poorly his profession or the duty which he owes his patients. The proper use of a remedy, however, is one thing, the abuse of it is another ; and I must express the opinion, founded on no small observation, that it is frequently resorted to in children when it is unnecessary—when necessary, it is often carried too far—and that in its general use, there is frequently an absence of precision and care, which in many cases renders it a most dangerous remedy. With regard to the use of bloodletting generally in this country, there can be no doubt that the authority of Dr. Rush has exerted an influence the most deleterious. That it should have done so is not surprising. Living at a time when medicine was yet in its infancy among us—at the head of the oldest and most influential of our medical schools and attracting by his enthusiasm and his eloquence a large proportion of the students of the country, his sway for a series of years was unlimited, and his sanguinary precepts and his still more sanguinary practice\* were speedily diffused from one end of

\* To justify the language used above, and which may be considered too strong by some, let me make a quotation or two from Dr. Rush's celebrated "Defence of Bloodletting." "Bleeding should be continued while the symptoms which first indicated it continue, should it be until four-fifths of the blood contained in the body are drawn away." *Med. Obs. & Inq.* Vol. 4, p. 353. The amount of blood in an adult is estimated at about 32 lbs. Four-fifths is over 24 lbs!

Again, in enumerating the advantages of bloodletting, he says: "In cases where bleeding does not cure, it may be used with ad-

the country to the other. Although sad experience has long since exposed the fallacy, as well as danger of his doctrines, yet many of the evil consequences of them are still to be met with; and not the least of these, it appears to me, is the opportunity which they have, indirectly at least, afforded for the prevalence of quackery. It is a

vantage as a *palliative* remedy. Many diseases induce death in a full and highly excited state of the system. Here opium does harm, while bleeding affords certain relief. It belongs to this remedy, in such cases, to save pain, to relieve convulsions, to compose the mind, to protract the use of reason, to induce sleep, and thus to smooth the passage out of life." *Med. Obs. and Inqs.* vol. 4, p. 357. In other words, if I understand him, one of the advantages of bleeding is, that it makes persons die easily! This reminds me of a melancholy case which I once witnessed. A young gentleman, about eighteen years of age, had been suffering about three months under organic disease of the brain. During this period he had been subjected to every kind of treatment. Bloodletting, emetics, cathartics, mercurials, tonics, &c., had all been used in succession, but without arresting at all the progress of the disease, and he had now become stone blind, was paralytic, and reduced to the extremest state of emaciation and debility. In short, he was barely kept alive by the use of stimulants. In this state of things a friendly doctor happened to drop in, and expressed the opinion that the disease was inflammation of the brain, and that a good bleeding would relieve him. Notwithstanding the urgent remonstrances of the attending physician, that the result would be almost immediate death, the idea took with his friends, and he was bled by the doctor who suggested the practice. As might have been expected, in about six hours he was a corpse, and the great consolation to his friends seemed to be that he died so easily! Verily, on becoming acquainted with such practice, one would be tempted to believe that the Emperor Nero must have been a very tender-hearted man in condemning Seneca to so pleasant a mode of terminating his existence as bleeding to death. For the particulars, see the *Annals of Tacitus*, Book 15, Sec. 60.

part of our nature to fly from one extreme to another. When an error is once exposed, we are apt to go immediately to its opposite, inferring that what is the reverse of wrong must necessarily be right ; and so it has been in regard to bloodletting. The public having been made acquainted with the evils of the practice of Dr. Rush, a prejudice, if not general, at least very extensive, has been created against the remedy itself, and empirics, always ready to play upon the weaknesses and prejudices of the community, have seized upon it for the mere purposes of traffic. Accordingly, the land is now filled with a set of men who pretend to practice medicine, without resorting not merely to bloodletting, but many of the other remedies sanctioned by long and tried experience. And what is melancholy, but true, they find a ready sympathy in a large portion of the community. Whether I am too severe in attributing the popular empiricism of the day to the influence of Dr. Rush, must be left to the judgment of the profession. One thing, however, is very certain, and which we see illustrated every day. Whenever a person has been overtaxed with active medicine, he is apt to discard all belief in medicine generally, and he is then ready to fall into any absurdity. It is with medicine as it is with religion. Superstition once thrown off, infidelity follows, and the result in both cases is the same. Calm reflection and rational inquiry are out of the question, and boasted independence speedily becomes the easy prey of the knave and the empiric.

## ESSAY VI.

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### OBSERVATIONS ON ERGOT.

In the whole range of the *materia medica* there is no article more interesting in its effects on the human system than ergot. Given during labor, it possesses the curious property (possessed by no other substance that we know of,) of exciting uterine action, and facilitating in a most extraordinary manner, the whole process of delivery. Upwards of forty years have now elapsed since its introduction into general practice in this country ;\*

\* Although used previously by the common people, ergot was first introduced into regular practice in 1807, by the late venerable Dr. John Stearns, of this city, at that time residing in Saratoga county, State of New York. As every thing connected with the use of this article is interesting, I shall give the brief letter of Dr. Stearns, in relation to it, addressed to Dr. S. Akerly of New York, dated, Jan. 25, 1807.

"In compliance with your request I herewith transmit you a sample of the *pulvis parturiens*, which I have been in the habit of using for several years with the most complete success. It expedites lingering parturition, and saves to the accoucheur a considerable portion of time, without producing any bad effects on the patient. The cases in which I have generally found this powder to be useful, are when the pains are lingering, have wholly sub-

and during portions of the same period, it has been extensively used in Great Britain and on the continent of Europe. After such ample experience,

sided, or are in any way incompetent to exclude the fœtus. Previous to its exhibition it is of the utmost consequence to ascertain the presentation, and whether any preternatural obstruction prevents the delivery: as the violent and almost incessant action which it induces in the uterus precludes the possibility of *turning*. The pains induced by it are peculiarly *forcing*; though not accompanied with that distress and agony of which the patients frequently complain when the action is much less. My method of administering it is either in decoction or powder. Boil half a drachm of the powder in half a pint of water, and give one-third every twenty minutes till the pains commence. In powder I give from five to ten grains; some patients require large doses, though I have generally found these sufficient.

“If the dose is large it will produce nausea and vomiting. In most cases you will be surprised with the suddenness of its operation; it is therefore necessary to be completely ready before you give the medicine, as the urgency of the pains will allow you but a short time afterwards. Since I have adopted the use of this powder I have seldom found a case that detained me more than three hours. Other physicians who have administered it concur with me in the success of its operation.

“The *modus operandi* I feel incompetent to explain. At the same time that it augments the action of the uterus, it appears to relax the rigidity of the contracted muscular fibres. May it not produce the beneficial effects of bleeding without inducing that extreme debility which is always consequent upon copious depletion? This appears to be corroborated by its nauseating effects on the stomach, and the known sympathy between this viscus and the uterus.

“It is a vegetable and appears to be a spurious growth of rye. On examining a granary where rye is stored, you will be able to procure a sufficient quantity from among that grain. Rye which grows in low, wet ground, yields it in greatest abundance. I have no objections to your giving this any publicity you may think proper.”—*New York Medical Repository. Edited by Samuel L. Mitchell, M. D., and Edward Miller, M. D., Vol. II., p. 308.*



we should naturally suppose that every thing in relation to its action would be completely established. Such, however, is not the case. Several important points are still under dispute, and it is upon these that it is proposed to make a few observations in the following paper.

1. By some it is *denied that ergot possesses any such property as is generally ascribed to it*. On this point it would seem hardly necessary to say any thing. Whether ergot does or does not possess such property, is a question which must be decided by the observations and testimony of those who have used it, and the mass of recorded as well as unrecorded evidence which we possess on this subject, is so abundant, as one would suppose, would be sufficient to preclude all doubt.\* Notwithstanding all this, it is maintained by some high authorities that ergot does not act upon the uterus, and in support of this opinion it is alleged that it has been frequently given without any such effect having followed; and when it has taken place, it is explained upon the ground of its being a mere

\* Bayle has collected the reports of sixty-two authorities on the subject of ergot, and out of 1176 cases of lingering labor in which it was used, 1051 were more or less promptly terminated by it. In 111 cases, it failed to produce any effect, and in 14 the success was moderate.—*Bibliothèque Therapeutique*, &c., par A. L. I. Bayle, tome iii., p. 534.

In addition to the foregoing mass of authority, I will only adduce the testimony of Dr. Ward, of New Jersey, who states that during six years, he gave it to between sixty and seventy patients, and in every case, except one, it produced powerful uterine contractions in fifteen or twenty minutes after its administration.—*New York Med. and Phys. Jour.* for 1825, Vol. IV., 212.



accidental coincidence, and that the uterine efforts would have been renewed just as certainly without its agency. Now that ergot has frequently been given without producing any effect on the uterus is readily admitted, and yet this by no means proves that it is destitute of the power ascribed to it. Some constitutions are doubtless not susceptible to its action. This we know to be the case with many agents, whose action on the human system is universally acknowledged. Besides, much of the alleged inefficacy of ergot may very readily be explained by the fact, now well known, that this article is not always precisely the same. From a variety of causes influencing the growth of this curious substance, independently of designed sophistications, it has been established that its properties differ very materially, and if these be not duly regarded, it is by no means wonderful that its use is frequently not followed by any effect. With regard to the supposition that the uterine action which follows its exhibition is a mere coincidence, it seems to me to be entirely done away with by the fact that the pains which are produced are entirely different in their character from those of ordinary labor. The latter are distinguished by perfect intermissions; while the former, are not only more severe, but they are continuous until the labor is completed. Females themselves are perfectly conscious of this difference in the two kinds of pain, and by them this difference has been frequently described. Besides this, the uniformity and rapidity with which the pains come on af-

ter the exhibition of ergot, is altogether irreconcilable with the supposition of its being a mere coincidence. If the pains came on at remote and variable periods, then indeed might there be some ground for denying the agency of the ergot in producing them. This, however, is not the case. As a general rule in from five to twenty minutes, severe and forcing pains come on,\* and after continuing for an hour or more, if the delivery be not completed, the same effects may be reproduced by a repetition of the dose. Now, if all this does not prove that the ergot is the cause of the uterine action, I am at a loss to conceive what kind of evidence will establish the action of any medicinal agent on the human system. If we still doubt in relation to ergot, we may with equal propriety doubt concerning the operation of ipecacuanha on the stomach, or of calomel on the liver. Although

\* By Dr. Prescott the time was precisely marked in twenty cases, "In two of these, the increased strength of the pains and the continued action commenced in seven minutes from the time the decoction was taken; in one case, it was eight minutes; in seven, it was ten; in three, eleven; and in three others, it was fifteen minutes; in the four remaining cases, there was no apparent operation until twenty minutes had expired."—*A Dissertation on Ergot*, by Oliver Prescott, A. M., p. 11, Boston, 1813.

Dr. Ward, as already quoted, states that he used it in sixty or seventy cases, and in all excepting one case, it produced "powerful uterine contraction in fifteen or twenty minutes after its administration."—*New York Med. and Phys. Journal*, Vol. II. p. 212.

Mr. John Paterson, of Aberdeen, states that he used it in eight cases, and it acted strongly in all, in less than five minutes after it was administered.—*Edin. Med. and Surg. Journal for Jan.*, 1840, p. 142.

there can therefore be no reasonable question about the operation of ergot, yet it is certain that it sometimes fails. This is a fact which has been frequently noticed by those who have prescribed it. Professor Dewees states that he has "in several instances failed to produce the slightest effect with the ergot procured at one shop, whilst that from another, in the same patient, has been as prompt as it was efficacious."\* The same thing has been observed by others. In a large majority of cases this can easily be accounted for. The character of this article is modified by a number of circumstances, all of which should be attended to if we wish to have it genuine. As these are important in a practical point of view, they are deserving of attention.

In the first place, the character of the season, as to dryness or moisture, appears to influence very materially the quality of the ergot. According to Burnett, it has been ascertained that the principle of the ergot resides in the diffuent peridium or external covering. Now if heavy rains fall at the time when the peridium is soft and moist, it will be washed away and the hardened nucleus, if wholly denuded, will be utterly inert. If the weather be fine during the maturation of the fungus, the diffuent peridium will be dried upon the spur, and the ergot be in its most active state. Hence it is, that although moisture favors the early growth of the

\* American Journal of Medical Sciences, Vol. I., p. 255.

ergot in the spring and summer, it requires a dry autumn to ensure its activity.\*

In the second place, the period when it is gathered has an influence on the character of the ergot. According to the experiments of Dr. Kluge of Mendelurtz, it would seem that it only displays its active properties, when collected before the cutting of the parent crop. At the Maternite of Mendelurtz, trials were made upon fifteen females, and the result was, that what was gathered before harvest was very energetic, while that collected after harvest was altogether powerless.† Whether this be true in its full extent or not, certain it is that there is a great difference in the strength of the article according to the time when it is gathered.

In the third place, the time it has been kept modifies the quality of the ergot. Although some experiments of Lorinser would seem to show that so far as its action on the stomach is concerned, it retains its active properties for two years,‡ yet the result of general observation has shown that its influence over the uterus is impaired if it be kept over the year in which it is collected. Like all other vegetables too, it is easily acted on by heat and moisture. To have it good, therefore, it should

\* Outlines of Botany, by Gilbert Burnett, Prof. of Botany in King's College, London, p. 207. Upon the same principle he explains the fact, that the grain in which the spur prevails in equal proportions, will in some years produce the dry gangrene, while in others it will not.

† American Journal of Medical Sciences, Vol. XII., p. 515.

‡ Edinburgh Med. and Surg. Journal for 1826, p. 453.

be fresh ; and it ought to be kept in bottles tightly stopped, and it should not be pulverized until required for use.\*

In the fourth place, a fictitious ergot has sometimes been sold for the real article. In this country and on the continent of Europe, where rye is extensively cultivated, and where of course there is an abundance of ergot, this is a fraud which is not likely to be met with. In England, however, where much less rye is grown, the ergot is occasionally very scarce, and this has led to a variety of impositions. Dr. O'Shaughnessy of London states, that a specimen of suspected ergot was once given him for analysis, and he found it to be composed of the sulphate of lime, which had been cast in a mould and colored, so as to imitate very closely the natural ergot.† Mr. Wright says he has sev-

\* In a recent number of the *Journal de Chimie Medicale*, the following method for preserving ergot in a good condition for several years, is recommended by M. Victor Legrip.

1. Reduce the recent ergot well dried into powder.
2. Expose the powder to a temperature of 45 or 50 degrees centigrade, (i. e. 104 or 122 Far.) in order to dry it thoroughly and quickly.

3. Put it into glass bottles and seal hermetically.

4. Withdraw it from the action of light by shutting it up either in a dark place or by covering the bottles with black paper.—*See London and Edinburgh Monthly Journal of Medical Science*, No. 52, April, 1845.

According to Mr. Wright, the best ergot is dry, and easily broken, purplish-black on the surface, pale-grayish in its substance, lighter than water, free of insects, inflammable and burning with a clear flame, and incapable of forming a dark-blue pulp when its powder is triturated with iodine and water.

† *Lancet* for 1830-31, Vol. I., p. 638.



eral times observed the ergot to be adulterated with common paste ; " a fraud," he suspects, " of very frequent occurrence, though not of very easy detection ; for the process of baking generally modifies the starch, so that it can scarcely be indicated by iodine."\*

The foregoing causes appear to me abundantly sufficient to account for the discrepancies in the statements which have appeared in relation to the action of this singular substance, as well as for the occasional failure which attends its use.

2. *Acting thus powerfully on the uterus, does ergot produce any effect upon the child ?* This is a question of great interest, and one which involves consequences of great importance, not merely in a professional, but in a moral point of view. On this subject, the opinion of the profession is divided. While some maintain that it produces no effect, at least no injurious effect upon the child, others contend that it frequently proves destructive of life, and that the general use of it is one of the causes of the great increase in the number of still-born children. An attentive examination of the subject, in all its bearings, will, I fear, but too certainly lead to a conclusion in favor of the latter opinion. From the peculiar effect of the ergot upon the uterus, it is evident that the child must sustain a degree of pressure entirely different from what it does in ordinary labor. In the first place, it is much greater. In the second place, it is unremit-

\* Edinburgh Med. and Surg. Journal, Oct. 1839, p. 297.



ting and continued, and that too for a considerable length of time. Now, it is by no means unreasonable to suppose that this pressure may frequently prove injurious and even fatal to the child. This would be more especially likely to happen in cases where the waters are discharged early, and where the uterus is contracting directly upon the child. In natural labor, the child has time to recover from the effects of pressure during the intervals between the pains, while here no such chance is afforded. And it is not irrational to suppose that the design in making the pains of labor intermitting, was not merely to allow the mother time to recover her strength, but also to enable the child to recover from the effects of pressure. That continued pressure may and does prove injurious to the child even in cases of ordinary labor, where this process is protracted, either from the disproportionate size of the child, or from the resistance of the parts through which it is to pass, is a fact well known. How much more likely is this to happen where an unnatural and unremitting pressure is kept up, as is the case under the influence of ergot? From these general considerations it would seem not merely perfectly natural, but unavoidable, that in many cases, the child must suffer from the use of ergot. After all, however, this is a question which must be decided by facts, and these will tend still further to countenance this opinion. So early as the year 1812, it was suggested by the editors of the New England Journal of Medicine and Surgery, that while fully convinced of the parturient

powers of the ergot, they were apprehensive that an evil of great magnitude not unfrequently resulted from its use ; and that was the death of the child. They stated that they had been led to this apprehension from "observing that in a large proportion of cases where the ergot was employed, the children did not respire for an unusual length of time after the birth, and in several cases the children were irrecoverably dead."\* Since then a large amount of testimony has been furnished confirmatory of the truth of this suggestion. In the same Journal,† a case is recorded of a female in her third labor, who was delivered of twins. After the first child was born, which was living, an hour elapsed without the recurrence of a single pain, in consequence of which it was determined to administer the ergot. Fifteen grains in powder were accordingly given in a little water. In fifteen or twenty minutes the pains came on and continued without remission until the child was born, which was in about twenty minutes from the time the pains commenced, the head being born first as in natural labor. The child, however, was still-born, and every effort to resuscitate it failed. It was in every respect as fine a child as the first, perfectly fresh and firm. The writer remarks that "every one who is acquainted with the facility with which in a case of twins, the second child makes its way into the world, will consider the

\* Vol. I., p. 70.

† Vol. II., p. 353.

death of the child in this instance as an unusual occurrence."

Dr. Ward of New Jersey, whose experience with this article appears to have been extensive, and who speaks of it as a valuable agent in many cases, nevertheless admits the danger which attends the child from its use. "In all the cases," he says, "in which I have given it, unless the child was expelled very soon after the powerful contractions came on, it suffered very much, and would lie for sometime without breathing." Again he says, "from my own observation, with regard to the ergot, as well as from other correct sources of information, I am led to conclude that in most cases, after giving it, unless the child is expelled in forty minutes after the powerful contractions come on, it will be born dead."\*

The late Dr. William Moore, a veteran practitioner of obstetrics in this city, after detailing some cases, gives his opinion in relation to ergot in the following terms: "It appears to be injurious to the child at all times; for in every case in which I have seen it exhibited, the child has been still-born, and in the greater part of them it was not possible to restore it to life.†

Dr. Hosack states that he gave the ergot in three cases, and "although no evidence existed previous to the use of the medicine, that the foetus was not

\* New York Med. and Phys. Journal, Vol. IV., p. 212.

† Compendium of Midwifery, by Samuel Bard, M. D., p. 214, 4th edition.

living, in every case in which it was administered, the child was still-born."\*

Dr. Chatard, of Baltimore, made two reports in relation to the effects of ergot. In the first, out of twelve cases in which it was given, six of the children were still-born.† In a second report, out of twenty-five cases, eight were still-born, two of whom were, however, resuscitated.‡

Dr. Holcombe, of New Jersey, says, "more children, I am satisfied from what I have seen and heard, have already perished by the injudicious use of ergot, during the few years which have followed its introduction into the practice of this country, than have been sacrificed by the unwarrantable use of the crotchet for a century past."§

Dr. Church, in seven cases, which he details, in which the ergot was used, had five children still-born. Although he thinks that in these cases the ergot had nothing to do with this result, yet he confesses that he "has no doubt if given in cases where there is great rigidity of muscular fibre, before the labor is advanced, when the os uteri is undilated, the external parts unrelaxed, and when blood-letting has not been premised, that the powerful and continued efforts of the uterus, caused by the ergot, will prevent the retreat of the child's head after it has advanced within the bones, and

\* New York Med. and Phys. Journal, Vol. I., p. 205.

† New York Medical Repository, Vol. XX., p. 17.

‡ Ibid, Vol. XXI., p. 160.

§ Philadelphia Journal of the Med. and Phys. Sciences, Vol. XI., p. 318.

that the unceasing pressure may in some instances occasion death.”\*

Dr. Davies, of London, reports ten cases in which the ergot was used. In four, the child was still-born. In a fifth, the child was apparently still-born, but soon recovered. In all the still-born cases, it appears that the child was not delivered until upwards of an hour had elapsed after the administration of the ergot. In the first, two hours elapsed ; in the second, a little more than an hour ; in the third, six hours ; in the fourth, a little over an hour.†

Mr. T. Chavasse, of Birmingham, states that in eighteen cases in which the ergot was used, the children were still-born.”‡

Mr. Jukes, of Birmingham, says that out of six cases in which he used it, five of the children were still-born.”§

Mr. P. H. Chavasse, reports nine cases in which its use was followed by the birth of still-born children, and in all before he administered the ergot, “there was every indication of the children being alive.”||

Mr. Elkington says that “several of his patients who took it, had still-born children.”¶

\* Philadelphia Journal of Med. and Phys. Sciences, Vol. VIII., p. 139.

† New England Journal of Med. and Surgery, Vol. XV., p. 18.

‡ Transactions of the Provincial Med. and Surg. Association, Vol. IV., copied into the Transactions of the New York State Med. Society, Vol. III., p. 353.

§ Trans. of the State Med. Society, Vol. III., p. 354.

|| Ibid., Vol. III., p. 355.

¶ Ibid., Vol. III., p. 354.



Mr. John Paterson, of Aberdeen, used the ergot in eight cases, and in three the children were still-born—"than which," he says, "no stronger evidence need be adduced of its extreme danger." In the three cases alluded to, he states, that he satisfied himself before its administration that the children were not only alive, but apparently strong and healthy ; but as soon as the action of the medicine commenced, these impressions became gradually less sensible to himself as well as to the mother. And he adds his doubts whether by the use of this article more deaths are not occasioned than by the use of instruments.\*

In addition to the foregoing, I adduce the following communication from one of my professional friends in this city, whose long experience entitles his opinions in relation to practical matters, to the highest consideration.

*New York, January 14th, 1841.*

*My dear sir :*

After what I considered a fair and full trial, I formed an opinion on the use of ergot, twenty-five years ago, and one which has governed me in practice ever since. I consider it a valuable article of the *Materia Medica*, to be used with great caution, and only in cases of clear necessity. I have reasons satisfactory to my own mind for believing that it has frequently destroyed foetuses and produced sterility in mothers. Entertaining this opinion I am surprised to see by some late

\* *Edinburgh Med. and Surg. Journal*, for Jan. 1840, p. 142.



publications that this article continues to be resorted to by some practitioners under very trivial pretexts. I mean on occasions, where, to say the least, it is totally unnecessary. It hastens labor, it is true, but I entertain so high a respect for the intelligence of nature, that I consider this hazardous method of bringing a child *into* the world before its time, as little better than sending it *out* before its time.

Yours truly,

CYRUS PERKINS.

Prof. J. B. BECK.

The facts which have thus been detailed, would seem to be abundant to show that the use of this article has in many cases proved injurious to the child. That it does not prove so in all cases, and that in the hands of those who have used it prudently and judiciously, it has never produced such an effect, is certainly no argument against the correctness of this conclusion. Even by those who have most frequently observed its fatal effects upon the child, it is admitted that this does not uniformly take place. The circumstances under which this difference of effect occurs, are easily explicable. As the danger of the child appears to be owing to the degree and duration of the pressure to which it is subjected, it would seem evident that just in proportion as the uterine organs are in a condition to admit of a speedy delivery after the ergot begins to operate, will the danger to the child be lessened; and on the other hand, in proportion as the deliv-

ery is protracted, will the danger be increased. This corresponds with the observation of Dr. Ward, already quoted, that whenever the child is not delivered in forty minutes after the action of the ergot commenced, it is generally still-born. For the same reason too it has been found more injurious when used in first labors, than in subsequent ones.

3. *Is ergot capable of producing any effect on the uterus anterior to the full term of gestation?* On this point there is also a great difference of opinion. Some contending that it acts only at the full period and when the process of labor has already commenced; while others assert that it exerts its influence at any period of pregnancy. To settle this question a great number of experiments have been made upon animals, the result of which is, that while in the majority it produced no effect, yet in a number it succeeded.

By Dr. Erskine, several experiments were made upon cats, at various periods of pregnancy, and in every instance it is stated that he succeeded in producing abortion.\*

By Dr. Oslere, experiments were also made upon animals, and with similar results. The first was on a sow, that was supposed to be in her seventh week of pregnancy. One drachm of the ergot was given and repeated again in the course of three hours. In the course of the night she had aborted nine small pigs, about the size of common

\* Philadelphia Journal of Med. and Phys. Science, Vol. XI., p. 112.

mice. His second experiment was upon a cow, which was supposed to be with calf, though not sufficiently advanced to be certain of the fact. Two ounces of ergot in powder were given about ten o'clock in the morning, and after suffering severe pain she aborted at six o'clock in the evening of the same day. The abortion was about the size of a common full grown rat, but very imperfectly formed. His third experiment was on a cat that appeared to be near her time of delivery. Sixteen grains of ergot in powder, mixed with butter, were given at eight o'clock in the evening, and the animal confined in a room. On visiting her the next morning, she was found to have been delivered of four kittens, all of which died during the day.\*

Dr. Oslere states as the result of his experiments, that he has not the least hesitation in believing that the ergot is capable of producing abortion at any period of utero-gestation.

Dr. Chatard, of Baltimore, tried its effects upon six cats, all more or less advanced in pregnancy. On the first, it acted as an emetic; the second was slightly purged; the third, fourth, and fifth, were not at all affected by it, although the last took a double dose of it at once, i. e., two drachms in powder; the sixth, half advanced in pregnancy, to which he gave but one drachm, had her legs paralyzed for a short time, in less than one hour, and abortion took place in twenty-four hours, preceded by considerable hæmorrhage.†

\* Philadelphia Jour. Med. and Phys. Sciences, Vol. XI., p. 113.

† New York Medical Repository, Vol. XXI., p. 163.

More recently several experiments were made upon different animals, by Mr. Wright, without producing any effect.\*

The only inference to be drawn from the foregoing facts, is that although ergot is capable of causing abortion in animals, it does not do so with any degree of certainty or uniformity.

That ergot has the power of inducing premature labor in the human subject, is now established by such a number of well-attested cases, as to leave no reasonable doubt on the subject.

Dr. Oslere, in a paper published in 1825, states that this had been successfully practiced by Prof. James, in the case of a woman whose pelvis was too small to permit the passage of a full grown child. She had several times been pregnant, and in every case the operation of embryulcia had been resorted to for her delivery. In a subsequent pregnancy, Dr. James suggested the propriety of bringing on premature labor by the use of ergot, and this was accomplished with success, not only in this but in several subsequent pregnancies.†

Dr. Dewees relates the following case : a female, whose husband had been absent a long time, became pregnant by illicit connection. Wishing to conceal her guilt she applied to a physician, who gave her some powders which he said would produce abortion. After taking several of them, severe pains came on, with hæmorrhage. In this state she was found by Dr. Dewees, and shortly after,\* she was delivered of twins at about the

\* Edinburgh Med. and Surg. Journal, for Jan. 1840, p. 31.

† Philadelphia Jour. of Med. and Phys. Sciences, Vol. XI., p. 114

fifth month. On examining a powder which was left, and which was similar to those she had taken, Dr. Dewees found it to be a drachm of ergot.\*

The most satisfactory testimony, however, on this subject, is that which has been furnished within a few years by several British physicians. In 1834, Dr. F. H. Ramsbotham, of London, detailed six cases, in which it was necessary to induce premature labor, and in all it was successfully brought about by the use of the ergot. In the first case, the pregnancy had advanced to eight months; in the second, to seven and a half; in the third, to seven and a half; in the fourth, to seven and a half; in the fifth, to eight; and in the sixth, to seven and a half months.†

In a subsequent paper, Dr. Ramsbotham has given an account of his practice in those cases, in which, from the narrowness of the pelvis, he was obliged to resort to the induction of premature labor. Of these he states that in all he had had sixty-two cases. In thirty-six cases the membranes were punctured, and in twenty-one of these the children were born alive, and sixteen were still-born. In twenty-six the labor was induced by ergot, without any other means being used; of these twelve were born alive, and fourteen still-born. Besides establishing, beyond all doubt, the fact that ergot is capable of exciting the uterus into action anterior to the full term, this report is important in another respect, and this is particu-

\* American Journal of Medical Sciences, Vol. III., p. 408.

† London Medical Gazette, June, 1834, p. 436.



larly noticed by the author. It is that the number of still-births in these cases was much greater in proportion in those in which the ergot was used, than in those in which the practice of puncturing the membranes was resorted to. Dr. Ramsbotham adds the remark, that he has seen the stimulating effects of ergot on the uterus in numerous cases of dangerous hæmorrhage in the early months, when it was desirable to procure a complete evacuation of that organ, and where no manual or instrumental means could be put in practice.\*

Dr. Paterson, of Glasgow, has reported the case of a woman in whom he succeeded in bringing on premature labor in two successive pregnancies by the use of ergot. In both cases it was about the seventh month.†

A similar case is reported by Mr. Heane, in which the ergot effected a premature delivery at the seventh month.‡

Another case occurred under the care of M. Dubois, of Paris, in the person of a dwarf, who in her first pregnancy was obliged to be delivered by perforating the head, and thus bringing away the child. On becoming pregnant a second time, he determined upon bringing on premature labor at the eighth month, by dilating the os uteri and the use of ergot. This was accordingly done with success, and a living child delivered.§

The foregoing evidence is conclusive as to the

\* London Medical Gazette for June, 1839, p. 422.

† Ibid, for June, 1839, p. 333.

‡ Ibid for January, 1839, p. 639.

§ Dunglison's American Med. Intelligencer, vol. iv. p. 126.



fact that ergot does exert its action on the uterus anterior to the full term of pregnancy. What the earliest period is, at which it is capable of producing this effect, it is impossible at present to determine.

4. *To what extent are we justified in using ergot?* If there be any truth or force in what has been said in relation to the effects of this article on the child, the answer to this question is obvious. In a professional as well as moral point of view, we have no more right to trifle with the life of the child than we have with the life of the mother. When, however, from the nature of the case, it becomes manifest that the life of the mother is in danger, we are not merely justified in using, but it is a positive duty to do so, every means to save her, disregarding every consequence that may result to the child. Now it is for such contingencies, that I conceive that ergot ought to be reserved. It should accordingly, I think, never be used except in cases where nature is incompetent to a safe delivery. By too many, it is to be feared, it has been and is still used merely as a *time-saving* agent. Than this, I cannot conceive of any practice more unjustifiable and reprehensible. As a general rule, nature is competent to a safe delivery, and we may rest assured that the best plan is to leave her alone to accomplish the work. Artificial and violent interference, whether it be applied in the shape of instruments or by the use of ergot, cannot but be improper.

## ESSAY VII.

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### AN ACCOUNT OF THE ORIGIN OF THE USE OF MERCURY IN INFLAMMATORY COMPLAINTS.

MERCURY, although known to the ancients, was not used by them as a medicine. By Dioscorides it is noticed, but as an article exceedingly deleterious in its operation on the system. Pliny also mentions it, but ascribes to it poisonous properties. Galen seems to have been equally ignorant of its true character and properties. It is to the Arabians that we are indebted for first establishing the fact, that when taken internally, this metal is not poisonous. Avicenna states distinctly, that large quantities of it may be swallowed without injury, the metal forcing a passage through the body simply by its specific gravity.\* In the shape of external applications, it was used by the Arabians in the treatment of various cutaneous affections.†

\* *Argentum quidem vivum plurimi qui bibunt, non læduntur eo. Egreditur enim cum dispositione sua per inferiorem regionem.*—*Avicen.* lib. 4.

† See *Lectures on the Materia Medica, &c.* By Charles Alston, M. D., Professor of Botany and the Materia Medica in the University of Edinburgh, 1770. Vol. I., p. 83. Also the *Medical Works of Richard Mead*, M. D. 1762, p. 100.

According to Dr. Friend, the power which mercury, when applied externally, has of causing salivation, appears to have been first established in the 13th century, by Theodorick, a friar, who afterwards became Bishop of Cervia. According to Alston, Paracelsus was probably the first who gave mercurial preparations internally. He died in the year 1541. In the year 1608, calomel was first described by Crollius in his *Basilica Chemica*.\* Except in the venereal disease, it was not until during the last century that any extensive use was made of the preparations of mercury; and it was then, that it was introduced into the treatment of inflammatory complaints. This practice took its rise in this country, and to the enterprize of American physicians is mainly due the credit of the general introduction of this powerful agent into practical medicine. The circumstances under which it originated, are the following.—Upwards of a century ago, the American Colonies were the scene of one of the most dreadful epidemics that ever desolated a country. It was generally denominated the *putrid sore throat*, and it commenced its career in May, 1735, at Kingston, an inland town of New Hampshire. From thence it spread itself gradually to the neighboring towns and villages. In the month of September of the same year, it reached Boston. Its progress westward was slow but uninterrupted. Nearly two years elapsed before it reached the Hudson river, from whence it continued to spread to the south and west, until it had

\* Paris' Pharmacologia, p. 52

involved the whole of the colonies in one common calamity.\* The numbers who fell victims to the disease were immense. Upon the population of New England, more especially, it committed the most dreadful ravages. According to the account furnished by Dr. Douglass, a physician of Boston, it appears that one-fourth of the inhabitants of that place were seized with it, and of these, one in thirty-five died of it. In other places, he states, that one-sixth, one-fourth, and even one-third of the sick fell victims to it.† By Dr. Kearsley, an eminent practitioner of Philadelphia, an affecting account has been left of its devastations. “Like most new diseases,” says he, “till their constitution and nature are known, it swept away all before it; it baffled every attempt to stop its progress, and seemed by its dire effects to be more like the drawn sword of vengeance to stop the growth of the colonies, than the natural progress of disease. In the New England governments, the stroke was felt with the greatest severity; villages were almost depopulated, and parents were left to bewail the loss of their tender offspring, till heaven, at last, the only unerring physician, was pleased to check its baneful influence.”‡

\* A Letter from Cadwallader Colden, Esq. to Dr. Fothergill, concerning the Throat Distemper, in the *Med. Observations and Inquiries of Lond.* Vol. I. p. 215.

† The Practical History of a new Eruptive Miliary Fever, with an angina ulcusculosa, which prevailed in New England in 1735 and 1736. By W. Douglass, M. D. *New England Jour.*, Vol. XIV.

‡ Observations on the Angina Maligna, or the Putrid and Ulcerous Sore Throat, with a method of treating it. By John Kearsley, Jr. *Gentleman's Magazine*, Vol. 39, p. 521.

Belknap, in his history of New Hampshire, states, that in that province not less than one thousand persons died of the disease, of whom nine hundred were under twenty years of age.\*

It was in attempting to arrest the ravages of this dreadful epidemic, that mercury appears to have been first introduced into the treatment of inflammatory complaints, and it is generally conceded that the credit of originality is due to Dr. William Douglass, an eccentric but eminent physician, of Boston. The preparation of mercury which he used was calomel. The following is his language in relation to it. "Where nature required any assistance, the principal intentions were with regard to the cuticular eruption and the *ulcusclosa* in the throat. Any affection in the throat does frequently produce a natural ptyalism; *mercurials* used with discretion, are a kind of specific in such like ulcers and *ulcusclosa*, and in fact, here they moistened the throat and mouth, stopt the spreading of the *ulcusclosa*, and promoted the casting off of the sloughs; and as an accessory advantage, (the patients being mostly children,) destroyed worms. Amongst all the preparations, *calomel* answered best, the gentle vomiting, or few stools that it occasioned in some, did not confound the natural course of the distemper. Turbath proves generally too strong a revulsion, and the eruption is thereby too much diverted. This distemper did not well bear any other evacuations but *mercurials*."†

This was published in the year 1736, and is the

\* History of New Hampshire. By Jeremy Belknap, Vol. 2, p. 95.

† New England Journal, Vol. 14, p. 4.



first notice we have of the practice. Although Dr. Douglass was thus the first to introduce the practice, yet the person who carried it to the greatest extent, and who seems to have regularly systematized it, was Dr. Jacob Ogden, a respectable physician of Long Island. In some letters\* which he published on this subject, containing the results of twenty years' experience, he commences by observing, that alexipharmic and sudorific medicines had long been esteemed as the basis of a radical cure in this disease, and had accordingly been universally recommended by writers on this subject. An ample experience, however, of these, as well as other remedies, represented as specifics, convinced him of their complete inadequacy in subduing the disease, and prompted him to resort to a new method of treatment. He accordingly, about 1749, tried the effects of mercury, joined with alexipharmics and astringents, which succeeded, as he states, "even beyond his expectations." *Calomel* was the form in which it was given, and the usual quantities were, to a child of a year old, two or three grains; to one of six or eight years, from four to five grains; and to a grown person, six or eight grains, repeated every twelve, sixteen, twenty, or twenty-four hours, as the urgency of the symptoms indicated. Generally speaking, he states, that this treatment arrested the disease in two or three days, provided it was commenced early. In alarming cases, or where the disease had been

\* See New York Medical Repository, Vol. 5, p. 97, where these letters are reprinted.



neglected, the remedy was given more freely. In one case, sixty-two grains were given in the course of twelve or fourteen days, to a patient nine years of age, and with perfect success.

In consequence of the reputation which calomel thus acquired in the treatment of this disease, it came very naturally to be resorted to in other inflammatory diseases, and accordingly, about the middle of the last century, it was in common use in pleurisy, pneumonia, inflammatory rheumatism, and other of the phlegmasiæ. The common practice was to give it in large doses, when used as a cathartic; and when given as an alterant, or to affect the system, in doses of one or two grains; and this was combined with camphor, antimony, or opium, according to circumstances—a practice precisely similar to that of the present day. On this subject we have the positive testimony of the venerable Dr. Holyoke, of Salem, who says, “I profess myself to have been in the habit of prescribing this mineral (mercury) ever since the year 1751 or 1752. About that time, pleurisies and peripneumonias were remarkably prevalent, and might be called epidemical; the practitioners of this place made free use of it at that time, and as we found its effects beneficial, have continued to employ it in similar cases ever since.”\* Concerning the use of mercury in Philadelphia, between 1760 and 1766, Dr. Rush has left us the following account. “Mercury was in general use in the years that have

\* See a Letter on the Introduction of the Mercurial Practice in the vicinity of Boston. By Edward A. Holyoke, M. D., in the New York Medical Repository, Vol. 1, p. 490.

been mentioned. It was given to prepare the body for the small pox. It was administered by my first preceptor in medicine, Dr. Redman, in the same disease when it appeared in the natural way, with malignant or inflammatory symptoms, in order to keep the salivary glands open and flowing, during the turn of the pock. But to Dr. Thomas Bond is the city of Philadelphia indebted, for the introduction of mercury into general use in the practice of medicine. He called it emphatically, 'a revolutionary remedy,' and prescribed it in all diseases which resisted the common modes of practice. He gave it liberally in the cynanche trachealis. He sometimes cured madness, by giving it in such quantities as to excite salivation. He attempted to cure pulmonary consumption by it, but without success; for at that time the influence of the relative actions of different diseases and remedies upon the human body was not known, or if known, no advantage was derived from it in the practice of medicine."\*

The foregoing is a sketch of the origin of the mercurial practice in this country, and it is very certain from this, that it prevailed here long before it was known or practiced in any other country. I have been the more minute in the preceding account, because I was desirous of correcting an error, into which one of the most popular writers of the present day has fallen, on this subject. I mean Dr. John Armstrong, the accomplished author of the work on typhus, who gives the sole credit

\* Observations and Inquiries, Vol. 4, p. 398.

of the practice to Dr. Robert Hamilton, of Lynn Regis.\* From the account furnished by Dr. Hamilton himself,† it appears that he was entirely ignorant of the powers of mercury in inflammation, until his attention was called to it, in the year 1764, by a British Navy Surgeon, who had become acquainted with its use in the treatment of hepatitis in the East Indies. Having tried it in that disease, and found it successful, Dr. Hamilton entered into some generalizations on the subject, and drew the conclusion that it might be rendered available in the other forms of inflammatory disease. The whole paper is that of an able and thinking man, and has elicited a high, though just tribute of praise, from the writer already alluded to.‡ It may fairly be inferred, from the account given by Dr. Hamilton, that he was unacquainted with the fact of the extensive use of mercury in this country, and therefore it detracts but little from his merit, that the very same practice which he recommended, and in the very same diseases, had been in common use here many years before his paper made its appearance.

\* Armstrong on Typhus, p. 327.

† See a Letter from Dr. Robert Hamilton to Dr. Duncan, giving an account of a successful method of treating inflammatory diseases by mercury and opium. *Med. Commentaries for 1783*, 4 & 5. Vol. 5, p. 120., Amer. Ed.

‡ "The paper originally published by Dr. Robert Hamilton, notwithstanding some of its defects, deserves to be engraved in letters of gold, on account of its great practical application and utility."—Armstrong on Typhus, &c., p. 385: Amer. Ed.















